Machine Vision Product Catalogue 2008

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Image Sensing Products

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IEEE1394b-2002 Standard

XCD Series Page 16

Features

1/1.8 type progressive scan CCD UXGA output

XCD-U100 (B/W)
XCD-U100CR (RAW color)

1/3 type progressive scan CCD SXGA output

XCD-SX90 (B/W)
XCD-SX90CR (RAW color)

1/3 type progressive scan CCD VGA output

XCD-V60 (B/W)
XCD-V60CR (RAW color)

- High image quality, high speed image output
- Daisy chain connection
- Hardware-based pre-processing: Equipped with LUT (Look Up Table) and uses 3x3 pixel matrix calculation (B/W model only)
- Bus synchronization
- Broadcast delivery of command
- Memory channel
- Bulk trigger mode
- Memory shot
- Partial scan
- Binning
- 9-pin connector with fixing screws
- Low power consumption, high vibration resistance, compact size
- IIDC Ver. 1.31 protocol compliant

5 Megapixel CCD Camera Link Output

XCL-5000 Series

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Features

2/3 type progressive scan CCD

B/W camera module Standard (non-PoCL)

XCL-5000

B/W camera module Standard (non-PoCL)/PoCL

XCL-5005

Color camera module Standard (non-PoCL)/PoCL

XCL-5005CR

XCL-5000 Series (shared)

- Effective picture elements: 2,456 (H) x 2,058 (V)
- Partial scan function
- Frame rate: 15 fps
- RS-232C control
- Normal/External trigger shutter
- C-mount
- High Shock and vibration resistance
- Output: Digital Camera Link 12 bit/10 bit/8 bit (switchable)

XCL-5000/XCL-5005 (B/W)

- Outline detection, Outline emphasis
- Binarization
- 3x3 pixel matrix calculation
- Read mode: Normal/Bining
- Flip-Flop (XCL-5005 only)

XCL-5005CR (color)

- One-push white balance
- Switching color output (RAW color or RGB)
- Color Bar Charts

B/W Camera Function Chart

Function \ Model			Intelligent		Digital Interface							
					IEEE1394b-2002			Camera Link				
			XCI-SX1	XCI-V3	XCD-U100	XCD-SX90	XCD-V60	XCL-5005	XCL-5000	XCL-U1000	XCL-X700	XCL-V500
Image device	Progressive Scan		●	●	●	●	●	●	●	●	●	●
CCD	Square Pixel		●	●	●	●	●	●	●	●	●	●
	1/3 type			●		●	●				●	●
	1/2 type		●									
	1/1.8 type				●					●		
	2/3 type							●	●			
Lens mount	C		●	●	●	●	●	●	●	●	●	●
	NF											
Output	VS (Video Sync.)											
	VBS											
	RGB											
	Y/C											
	VGA format			●			●					●
	SVGA format											
	XGA format										●	
	SXGA format		●			●						
	UXGA format				●					●		
	5 Mega							●	●			
	1N non interlace											
	Partial scanning		●	●	●	●	●	●	●	●	●	●
	Digital	IEEE1394			●	●	●					
		Camera Link						●	●	●	●	●
External synchronization	HD/VD										●	●
	VS											
Restart/Reset											●	●
Long exposure			●	●	●	●	●	●	●	●	●	●
Shutter	Normal		●	●	●	●	●	●	●	●	●	●
	External trigger shutter	Mode1 (Non-reset mode)									●	●
		Mode2 (Reset mode)						●	●	●	●	●
		Others	●	●	*1 ●	*1 ●	*1 ●	●	●	●		
One shot					●	●	●					
CCD Iris					●	●	●					
White balance	ATW											
	One push											
	Fixed											
	Manual											
Others	Negative/ positive reversal		●	●	●	●	●			●		
	RS-232C control		●	●				●	●	●	●	●
	Near infrared ray measures											
	Near ultraviolet ray measures											
See page			10	10	16	16	16	22	22	26	30	30

*1: IEEE1394 Digital camera protocol Trigger mode 0.1.14.15

Function \ Model			Non TV Format							TV Format	
			XC-HR90	XC-HR70	XC-HR50	XC-HR57	XC-HR58	XC-56	XC-56BB	XC-ST70 XC-ST70CE	XC-ST50 XC-ST50CE
Image device	Progressive Scan		●	●	●	●	●	●	●		
CCD	Square Pixel		●	●	●	●	●	●	●		
	1/3 type		●	●	●			●	●		
	1/2 type					●	●				●
	1/1.8 type										
	2/3 type									●	
Lens mount	C		●	●	●	●	●	●		●	●
	NF								●		
Output	VS (Video Sync.)		●	●	●	●	●	●	●	●	●
	VBS										
	RGB										
	Y/C										
	VGA format				*2 ●	*2 ●		*2 ●	*2 ●		
	SVGA format						*2 ●				
	XGA format			*2 ●							
	SXGA format		*2 ●								
	UXGA format										
	5 Mega										
	1N non interlace		*2 ●	*2 ●	*2 ●	*2 ●	*2 ●	*2 ●	*2 ●		
	Partial scanning		●	●	●	●	●	●			
	Digital	IEEE1394									
		Camera Link									
External synchronization	HD/VD		●	●	●	●	●	●	●	●	●
	VS									●	●
Restart/Reset			●	●	●	●	●	●	●	●	●
Long exposure			●	●	●	●	●	●	●	●	●
Shutter	Normal		●	●	●	●	●	●	●	●	●
	External trigger shutter	Mode1 (Non-reset mode)	●	●	●	●	●	●	●	●	●
		Mode2 (Reset mode)	●	●	●	●	●	●	●	●	●
		Others									
One shot											
CCD Iris											
White balance	ATW										
	One push										
	Fixed										
	Manual										
Others	Negative/ positive reversal										
	RS-232C control		●								
	Near infrared ray measures										
	Near ultraviolet ray measures										
See page			36	40	44	44	48	52	56	62	62

*2 : Requires specific acquisition board.

Function \ Model			TV Format								
			XC-ST51 XC-ST51CE	XC-ST30 XC-ST30CE	XC-ES50 XC-ES50CE	XC-ES51 XC-ES51CE	XC-ES30 XC-ES30CE	XC-EI50 XC-EI50CE	XC-EI30 XC-EI30CE	XC-EU50 XC-EU50CE	XC-ES50L XC-ES50LCE
Image device	Progressive Scan										
CCD	Square Pixel										
	1/3 type			●			●		●		
	1/2 type		●		●	●		●		●	●
	1/1.8 type										
	2/3 type										
Lens mount	C		●	●	●	●	●	●	●	●	●
	NF										
Output	VS (Video Sync.)		●	●	●	●	●	●	●	●	●
	VBS										
	RGB										
	Y/C										
	VGA format										
	SVGA format										
	XGA format										
	SXGA format										
	UXGA format										
	5 Mega										
	1N non interlace										
	Partial scanning										
	Digital	IEEE1394									
		Camera Link									
External synchronization	HD/VD		●	●	●	●	●	●	●	●	●
	VS		●	●							
Restart/Reset			●	●	●	●	●	●	●	●	●
Long exposure			●	●	●	●	●	●	●	●	●
Shutter	Normal		●	●	●	●	●	●	●	●	●
	External trigger shutter	Mode1 (Non-reset mode)	●	●	●	●	●	●	●	●	●
		Mode2 (Reset mode)	●	●	●	●	●	●	●	●	●
		Others									
One shot											
CCD Iris											
White balance	ATW										
	One push										
	Fixed										
	Manual										
Others	Negative/ positive reversal										
	RS-232C control										
	Near infrared ray measures							●	●		
	Near ultraviolet ray measures									●	
See page			62	62	66	66	66	70	70	74	80

Colour Camera Function Chart

Function \ Model			Digital Interface					TV Format
			IEEE1394b-2002			Camera Link		
			XCD-U100CR	XCD-SX90CR	XCD-V60CR	XCL-5005CR	XCL-U1000C	XC-555 XC-555P
Image device	Progressive Scan		●	●	●	●	●	
CCD	Square Pixel		●	●	●	●	●	
	1/3 type			●	●			
	1/2 type							●
	1/1.8 type		●				●	
	2/3 type					●		
Lens mount	C		●	●	●	●	●	
	NF							●
Output	VS (Video Sync.)							
	VBS							●
	RGB							
	Y/C							●
	VGA format				●			
	SVGA format							
	XGA format							
	SXGA format			●				
	UXGA format		●				●	
	5 Mega					●		
	1N non interlace							
	Partial scanning		●	●	●	●	●	
	Digital	IEEE1394	●	●	●			
		Camera Link				●	●	
External synchronization	HD/VD							●
	VS							●
Restart/Reset								
Long exposure			●	●	●	●	●	
Shutter	Normal		●	●	●	●	●	●
	External trigger shutter	Mode1 (Non-reset mode)						
		Mode2 (Reset mode)				●	●	
		Others	*3 ●	*3 ●	*3 ●	●	●	
One shot			●	●	●			
CCD Iris			●	●	●			●
White balance	ATW		●	●	●			●
	One push		●	●	●	●	●	*4 ●
	Fixed		●	●	●	●	●	●
	Manual		●	●	●	●	●	●
Others	Negative/ positive reversal		●	●	●		●	*4 ●
	RS-232C control					●	●	●
	Near infrared ray measures							
	Near ultraviolet ray measures							
See page			16	16	16	22	26	84

*3: IEEE1394 Digital camera protocol Trigger mode 01.14.15 *4: Only controled by RS-232C

XCI-SX1
XCI-V3

Intelligent | All-in-One | PC Less | Progressive Scan | 1/2 Type CCD *1 | 1/3 Type CCD *2 | Square Pixels
C Lens Mount | SXGA Output *1 | VGA Output *2 | Long Exposure | Partial Scan | Normal Shutter | External Trigger Shutter
B/W

*1:XCI-SX1
*2:XCI-V3

All-in-One INTELLIGENT

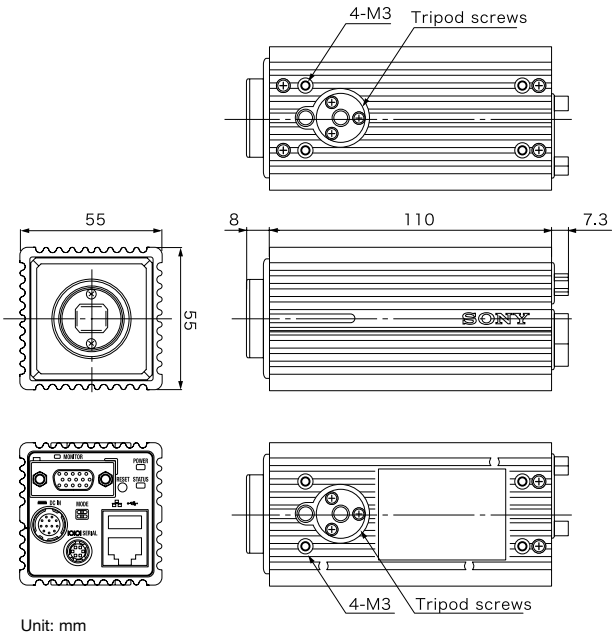
Connection Diagram P14

Outline

Sony introduces the XCI-SX1 and XCI-V3, equipped with a 1/2-type SXGA (1280x1024) progressive scan CCD and a 1/3-type VGA (640x480) progressive scan CCD, respectively. Both cameras have an embedded CPU and a 100Base-TX/10Base-T interface for network connectivity. Incorporating the high-performance and flexible AMD Geode TM GX533 processor and Linux® kernel, the XCI-SX1 and XCI-V3 are designed to allow integrators to install a variety of imageprocessing software applications or to develop and apply customized applications to meet specific user needs. If preferred, the camera operating system can be replaced with Microsoft® Windows® XP Embedded *3 for flexible system integration with your Windows-based system. Unlike conventional machine vision cameras, images captured by these intelligent cameras are processed within the camera and the processed data is directly transmitted to a PC over a network. These cameras eliminate the need for conventional image-processing systems and allows for simple setup and efficient factory workflow. With its high-performance, flexible integration, and versatile interfaces the durably designed XCI-SX1and XCI-V3 Intelligent Cameras are ideal for a wide range of machine vision applications such as object recognition, inspection, measurement, alignment, and more.

*3 Windows XP Embedded must be purchased separately from Microsoft Corporation. Contact your local Sony sales office or authorized dealer for instructions on how.

Dimensions



Unit: mm

Features

■ High Performance 400MHz Geode GX533 Processor
- x86-compatible architecture
- 256MB main memory (DDR-SDRAM)and 1MB flash memory
- Integrated 128 MB Compact Flash™ memory card
- Low power consumption

■ Various Interfaces
- 100Base-TX/10Base-T interface for network operation
- Monitor output
- USB 1.1 interface
- RS-232C serial interface and digital input/output allow cameras to be connected with external equipment such as sensors, strobe lights, and Programmable Logic Controllers (PLC).

■ 1/2-type (XCI-SX1) and 1/3-type (XCI-V3), Progressive Scan CCDs With Square Pixels

■ Linux or Microsoft Windows XP Embedded Support *4

■ High-Quality Images
- XCI-SX1: SXGA (1280 x 1024) at 15 fps
- XCI-V3: VGA (640 x 480) at 60 fps

■ Horizontal and Vertical Partial Scanning Function
Allows users to select a specific scanning area to reduce data size and increase frame rate, which minimizes image processing time.

■ Binning Function
- Vertical binning combines image data for every two lines vertically to increase the frame rate, which minimizes image processing time.
- Horizontal binning combines image data for every two pixels horizontally, thereby increasing the sensitivity, and shortening the capture speed, which minimizes image processing time.

■ Accurate Image Capture Timing
Equipped with an external trigger input and a trigger delay function of up to four seconds in 1 ms intervals, these cameras can accurately capture images of fast moving objects such as in production lines. What's more, the XCI-V3 is equipped with a strobe adjustment function to accurately time an external strobe light.

■ Built-in Real Time 3 x 3 Image Pre-Processing Filter
The XCI-V3 camera features a 3 x 3 filter that can be used to emphasize the edges of an object or to change the contrast so that image details stand out.

■ Compact and Lightweight
55 (W) x 55 (H) x 110 (D) mm, 400 g

■ Easy Camera Settings

■ High Shock and Vibration Resistance

*4 The Linux kernel and camera driver are preinstalled in these cameras. Please contact your local Sony sales office or authorized dealer for information on converting the system to Windows XP Embedded.

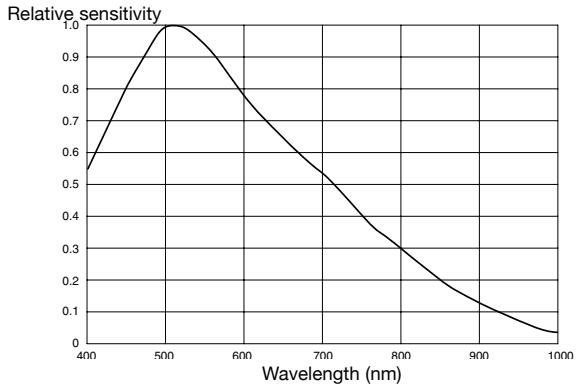
Accessories

■ Compact camera adaptor
●DC-700/DC-700CE

■ 12-pin camera cable
●CCXC-12P02N (2 m)
●CCXC-12P05N (5 m)
●CCXC-12P10N (10 m)
●CCXC-12P25N (25 m)

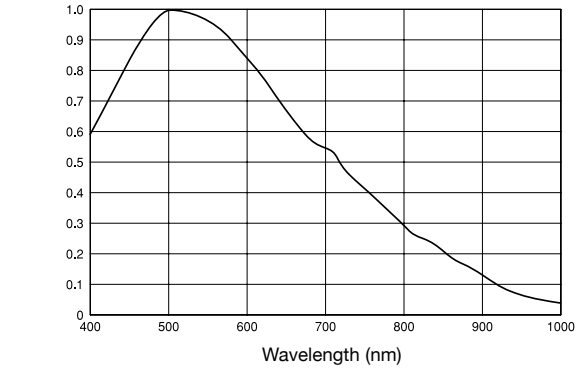
Spectral Sensitivity Characteristics

●XCI-SX1



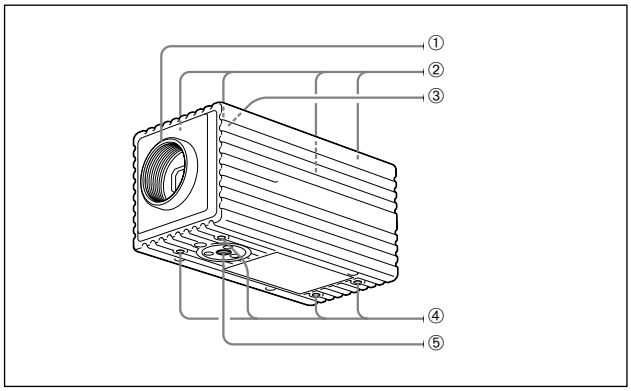
(Lens characteristics and light source characteristics excluded.)

●XCI-V3



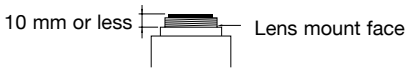
(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls



① **Lens mount (C-mount)**
Attach any C-mount lens or other optical equipment.

Note
The lens must not project more than 10 mm from the lens mount.



② **Auxiliary reference holes (Top)**

③ **Tripod holes (Top)**

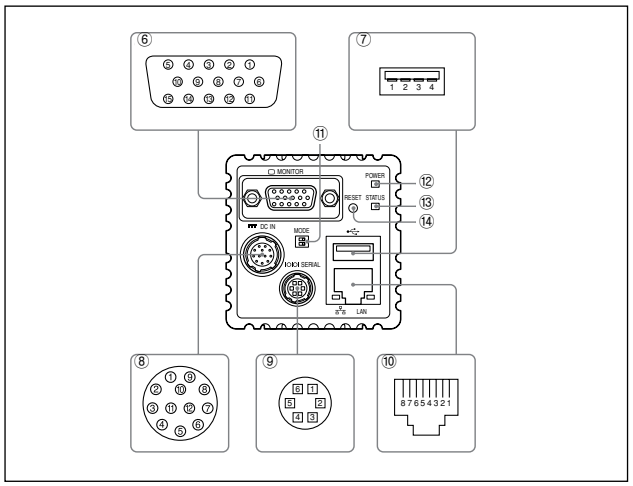
④ **Reference holes (Bottom)**
These precision screw holes are for locking the camera. Locking the camera into these holes secures the optical axis alignment.

⑤ **Tripod holes (Bottom)**

Specifications

	XCI-SX1	XCI-V3
Image device	1/2 type IT progressive scan CCD	1/3 type IT progressive scan CCD
Effective picture elements	1,280 (H) x 1,024 (V) (SXGA)	640 (H) x 480 (V) (VGA)
Cell size	4.65 µm (H) x 4.65 µm (V)	7.4 µm (H) x 7.4 µm (V)
Frame rate	15 fps @ SXGA	60 fps @ VGA
Image output	8 bit	
Gain	Manual (0 to 18 dB, 1 dB steps)	
Shutter speed	2 to 1/50,000 sec (Trigger mode) , 2 to 1/100,000 sec (Normal mode)	
Binning	Vertical/horizontal binning	
Partial scan	Vertical random read scan: 32 to 1,024 lines, 32-line steps Horizontal random read scan: 384 to 1,280 pixels, 128-pixel steps Frame rate (example): 34 fps (VGA), 21 fps (XGA)	Vertical random read scan: 30 to 480 lines, 30-line steps Horizontal random read scan: 192 to 640 pixels, 64-pixel steps Frame rate (example): 300 fps (30-lines)
External trigger	Mode: Pulse edge detection, pulse width detection Delay function: 0 to 4 sec (1 ms steps) Exposure start delay amount: 10 µs max.	
Lookup table	Luminance value conversion (gamma correction, 2 values, negative/positive reversal, etc.)	
CPU	x86, AMD Geode GX533, 400 MHz	
Memory	256 MB DDR-SDRAM, 128 MB CompactFlash	
OS	Linux (Kernel version 2.4.18)	
LAN	10Base-T/100Base-TX, Network protocol: TCP/IP (IPv4), HTTP, FTP	
Monitor output	D-sub 15-pin multi-scan monitor support	
USB	Version 1.1	
Serial interface	RS-232C	
Digital I/O	TTL IN/OUT, Isolated IN/OUT, Trigger IN, Exposure OUT	
Lens mount	C-mount	
Minimum illumination	4 lx (F1.4, +18 dB gain)	1 lx (F1.4, +18 dB gain)
Power requirements	10.5 to 26.4 V	
Power consumption	7.8 W	7.5 W
Dimensions	55 (W) x 55 (H) x 110 (D) mm	
Mass	400 g	
Operating temperature	-5 to +45 °C	
Storage temperature	-30 to +60 °C	
Performance guarantee temperature	0 to +40 °C	
Operating humidity	20 to 80% (no condensation)	
Storage humidity	20 to 95% (no condensation)	
Vibration resistance	10 G (20 to 200 Hz)	
Shock resistance	70 G	
MTBF	37,931 hrs (Approx. 4.3 years)	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003: Class A, CE: EN55022, EN55024, EN61326, AS/NZ: EN55022, VCCI: Class A	
Supplied accessories	Lens mount cap, Operating instructions	

Rear Panel/Connector Pin Assignments



⑥ MONITOR (monitor output) connector (15-pin)

You can connect a monitor cable to this connector to display an image on a multiscan monitor supporting SXGA resolution.

Note

If you connect a multiscan monitor that does not support SXGA resolution, an image may not be displayed.

Pin No.	Signal	Pin No.	Signal
1	R output	9	NC
2	G output	10	Ground
3	B output	11	NC
4	NC	12	NC
5	Ground	13	H output
6	Ground	14	V output
7	Ground	15	NC
8	Ground		

⑦ USB connector

You can connect a USB mouse/keyboard to this connector to contol a camera.

Pin No.	Signal	Pin No.	Signal
1	VBUS	3	D+
2	D-	4	Ground

⑧ DC IN (DC power input) connector (12-pin)

You can connect a CCXC-12P05N camera cable to input the +12 V DC power supply. The pin configuration of this connector is as follows.

Pin No.	Signal	Pin No.	Signal
1	Ground	8	Ground
2	+12 V DC	9	ISO output -
3	Ground	10	Exposure pulse output
4	ISO output +		
5	Ground	11	Triger pulse input
6	TTL input	12	Ground
7	TTL output		

⑨ SERIAL connector (6-pin)

You can connect a serial cable to this connector to control a camera from a camera control device (e.g., PC).

Pin No.	Signal	Pin No.	Signal
1	TXD (RS-232C)	4	ISO output +
2	RXD (RS-232C)	5	ISO output -
3	Ground (RS-232C)	6	NC/TTL output*

*XCI-SX1 : NC
XCI-V3 : TTL output

⑩ LAN connector

You can connect a LAN cable to this connector to output a video signal to the host device.

Pin No.	Signal	Pin No.	Signal
1	TD+	5	NC
2	TD-	6	RD-
3	RD+	7	NC
4	NC	8	NC

⑪ MODE switches

For service use. Both switches are set to the left side as the factory setting.

Note

If either of these switches is set to the right side, the camera doesn't start normally.

⑫ POWER LED

Lights in green when power is input.

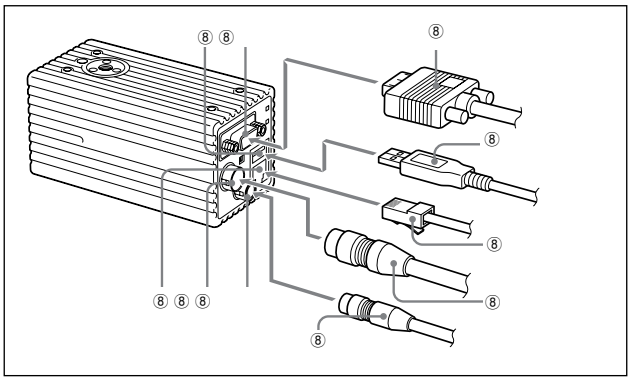
⑬ STATUS LED

Lights in red when the BIOS is starting up.

⑭ RESET switch

Push to restart the camera.

Connecting the cables



⑧ Monitor cable
⑧ USB cable
⑧ LAN cable
⑧ Camera cable
⑧ Serial cable
⑧ MONITOR connector
⑧ USB connector
⑧ DC IN connector
⑧ SERIAL connector
⑧ LAN connector

Connect the camera cable to the DC IN connector.
Also, if needed, connect the LAN cable to the LAN connector, the monitor cable to the MONITOR connector, the serial cable to the SERIAL connector, and the USB mouse/keyboard to the USB connector respectively.
When you connect the monitor cable, turn the two fastening screws to secure the cable tightly.

Connect the other end of the camera cable to the DC-700/700CE and the other end the camera. Also, if needed, connect the LAN cable to the host device, and the monitor cable to the monitor, and the serial cable to the camera control device.

Note

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting a trigger signal. If you input external signals to a camera module without the power supplied, this may cause a malfunction of the camera module.

Normal Mode

This mode can be set on the SHUTTER screen in the GUI application for camera settings.
For the XCI-SX1, output of all individual video signals [1280 (H) x 1024 (V)] is at 15 frames per second as continuous video.
For the XCI-V3, output of all individual video signals [640 (H) x 480 (V)] is at 60 frames per second as continous video.
Continuous normal images can be captured in this mode.
When you set the shutter speed higher, you can capture the high-speed movement of objects with vivid clarity.

Trigger Mode

This mode can be set on the SHUTTER screen in the GUI application for camera settings. In this mode video signals begin to accumulate by synchronizing with external trigger input.
The video signals are output after the exposure is finished.
The high-speed movement of objects can be captured with vivid clarity in this mode. Set the shutter speed in accordance with the recording conditions.

Select the shutter speed from the following:
[2, 1, 1/15, 1/30, 1/60, 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/25000, 1/50000, Trigger Width] (sec)

When selecting Trigger Width
The mode is set to trigger pulse width detection mode.
The following is the formula for the shutter speed T[s]:
T[s] = Trigger width + 6us

You can also set the following on the SHUTTER screen in the GUI application for camera settings:

- **Trigger polarity**
  This is set to select a trigger input polarity for the camera.

- **Trigger delay function**
  This function is to delay trigger input to this unit, so the exposure start time can be delayed until the set time.
  You can fine adjust the capture timing without changing the camera position even after the camera is installed.

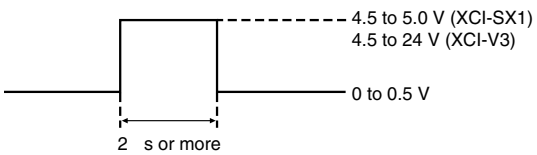
  Trigger delay setting range:
  [0 to 4 (sec)] (In units of 1ms)

- **Software trigger function**
  A trigger is generated within this unit to capture a still image at any timing.

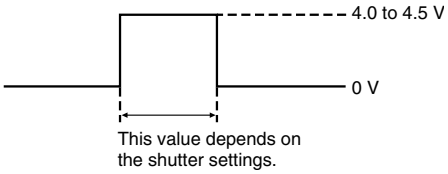
Input Specifications

The voltages and pulse widths are values that are measured by the DC IN (12-pin) and SERIAL (6-pin) connectors on the rear of the camera.

- **Trigger input (DC IN 12-pin connector)**



- **Exposure output (DC IN 12-pin connector)**
  The amplitude level is the measure of central tendency terminated with 10 kΩ.



Binning Mode

This mode can be set on the HIGH RATE SCAN screen in the GUI application for camera settings.
This mode is used to increase the frame rate and/or sensitivity by adding pixels in both vertical and horizontal directions.
Select one of the following modes depending on the binning method.

- **1 X 2 (V-binning) mode**
  In this mode the frame rate almost doubles and the data volume becomes half by adding two vertical lines.
  When the shutter speed is set, the sensitivity almost doubles.

- **2 X 1 (H-binning) mode**
  In this mode the sensitivity almost doubles and the data volume becomes half by adding two horizontal pixels.
  As the horizontal synchronization signal frequency is the same as when in normal mode, the frame rate doesn't change.

- **2 X 2 (HV-binning) mode**
  In this mode the frame rate and sensitivity almost double and the data volume becomes 1/4 by adding two vertical lines and two horizontal pixels.
  Moreover, when the shutter speed is set, the sensitivity almost doubles again.

High Rate Scan Mode

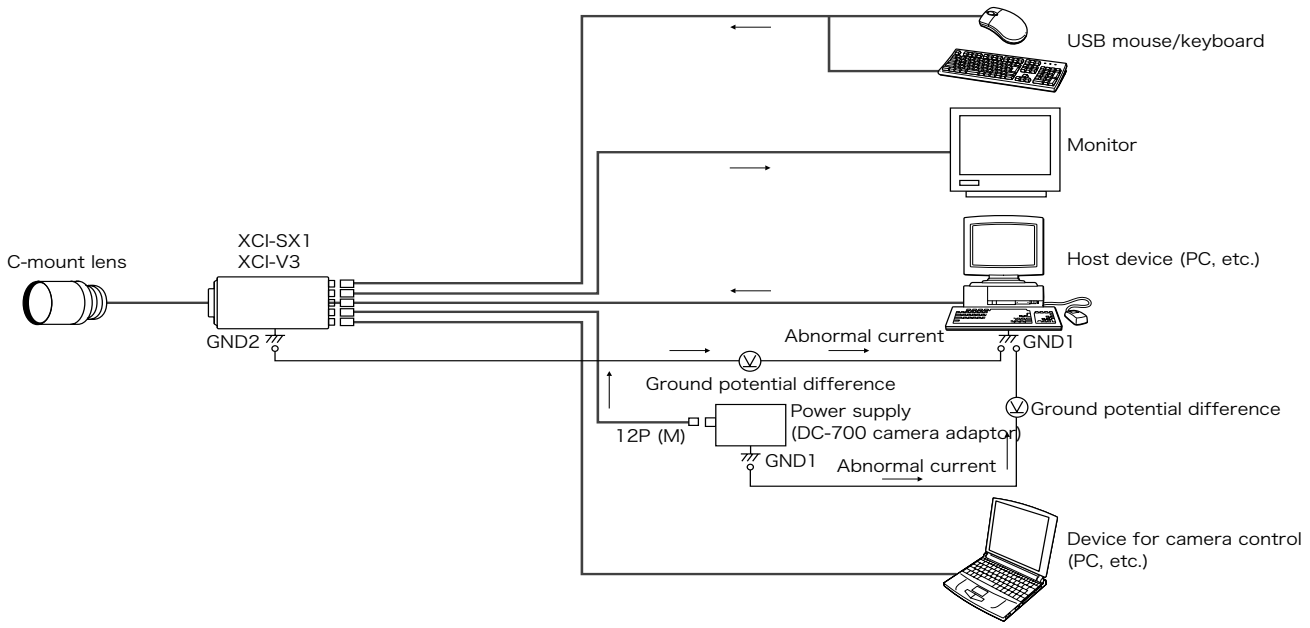
This mode can be set on the HIGH RATE SCAN screen in the GUI application for camera settings.
In this mode, the desired rectangle area is read out, and the redundant image area is transmitted at high speed to raise the frame rate. The read out area can be set separately as effective image area is vertically and horizontally. For the XCI-SX1, the effective image area is vertically divided into 32 areas and horizontally divided into 10 areas. For the XCI-V3, the effective image area is vertically divided into 16 areas and horizontally divided into 10 areas.
The tables below show approximate frame rate values when the high rate scan mode is used.

External Control Command

The XCI-SX1 can be controlled externally from a host device via a serial communication and telnet using such communication softwares as “HyperTerminal" or "Tera Term."

Connection Diagram

XCI-SX1/XCI-V3



Recommended lens for the XCI-SX1: High-resolution e-mount lens

XCD-U100 (B/W) NEW
XCD-U100CR (RAW Colour) NEW
XCD-SX90 (B/W) NEW
XCD-SX90CR (RAW Colour) NEW
XCD-V60 (B/W) NEW
XCD-V60CR (RAW Colour) NEW

IEEE-1394b Digital Output | Progressive Scan | Square Pixels | *1 1/1.8 Type CCD | *2 1/3 Type CCD | C Lens Mount | UXGA Output | SXGA Output | VGA Output

Partial Scan | Long Exposure | Normal Shutter | External Trigger Shutter | One Shot | CCD Iris | Nega/Posi Reversal | B/W | RAW Color

*1 : XCD-U100/U100CR
*2 : XCD-SX90/SX90CR/V60/V60CR

Connection Diagram P34

Outline

The six models of the XCD-series digital camera modules (Black and white models and RAW Colour models) employing the IEEE1394b-2002 standard are equipped with quality digital camera features.
Although it is compact, the camera allows high-speed image transfer and daisy chain connection with two IEEE1394b connectors. The camera also has versatile features such as hardware preprocessing in the camera that reduces the load of image processing in a PC, bus synchronization, and broadcast delivery of commands.
The XCD-series digital output cameras conforming to the IIDC 1.31 protocol take full advantages of IEEE1394 capabilities.

Features

■ High image quality, high-speed image output

The image device, output frame rate and resolution of the cameras are as follows:

- XCD-V60/V60CR: 1/3-type PS IT CCD, 90 fps, VGA
- XCD-SX90/SX90CR: 1/3-type PS IT CCD, 30 fps, SXGA
- XCD-U100/U100CR: 1/1.8-type PS IT CCD, 15 fps, UXGA

■ Daisy chain connection

The camera is equipped with two IEEE1394b connectors that support connection of multiple cameras. As the power can be supplied from a 12-pin connector (EIAJ), the camera achieves daisy chain connection without limitation of power supply capacity so that a simple image processing system with multiple cameras can be developed.

■ Hardware preprocessing

The camera is equipped with hardware LUT (Lookup Table). The black and white models are also equipped with 3 x 3 pixel matrix operation.

■ Bus synchronization

The cameras connected to the same bus automatically operate in synchronization with the 1394 bus, without using an external sync signal. The exposure timing on multiple cameras is synchronized correctly via the IEEE1394b cable only.

■ Broadcast delivery of commands

The camera settings for all the cameras connected to the same bus can be changed at the same time. For example, the gain or shutter speed is set to the same value on all the cameras, or exposure starts on all the cameras simultaneously using a software trigger.

■ Memory channel

The memory channel allows storage of up to 15 sets of camera settings such as gain and shutter.

■ Bulk trigger mode

The Bulk trigger mode allows output of multiple images with a shot of a trigger signal. Each image is shot with the camera settings stored in the memory channel. Up to 15 image settings are possible.

■ Memory shot

The image exposed from the sensor is stored in the camera's built-in memory. The stored image can be read out using a command from the host PC when required.

		XCD-U100 XCD-U100CR	XCD-SX90 XCD-SX90CR	XCD-V60 XCD-V60CR
Standard image size (H X V)		1,600 X 1,200 (UXGA)	1,280 X 960 (SXGA)	640 X 480 (VGA)
Bit length	Mono8/ Raw8	8 frames	13 frames	54 frames
	Mono16/ Raw16	4 frames	6 frames	27 frames

■ Partial scan

Partial scan clips a required angle of view (area) from the entire screen to be read out. As a part of the image is read out, the unit takes advantage of reduced image data and high-speed transfer. The minimum clipping unit is 32 pixels X 24 lines.

■ Binning

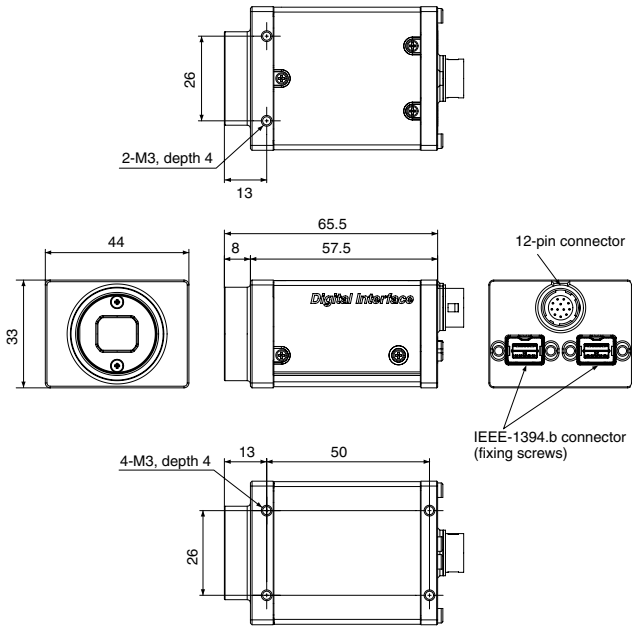
Binning increases the sensitivity and frame rate based on mixing the pixel data.

■ 9-pin connector with fixing screws

■ Low power consumption, vibration-resistant structure, and compact size

■ IIDC Ver.1.31 protocol compliant

Dimensions



Unit: mm

Accessories

■ Compact camera adaptor
- •DC-700 00CE

■ 12-pin camera cable (CE standard)
- •CCXC-12P02N (2 m)
- •CCXC-12P05N (5 m)
- •CCXC-12P10N (10 m)
- •CCXC-12P25N (25 m)

■ Tripod adaptor
- •VCT-ST70I

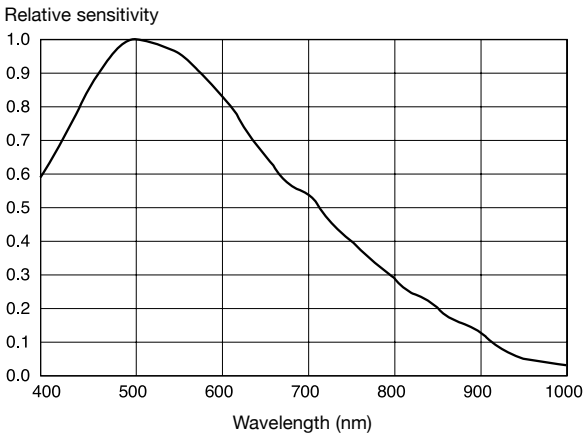
Specifications

	XCD-U100	XCD-U100CR	XCD-SX90	XCD-SX90CR	XCD-V60	XCD-V60CR
Image sensor	1/1.8-type progressive scan IT transfer CCD		1/3-type progressive scan IT transfer CCD			
Effective lines /Output image size	1,600 x 1,200 (UXGA)		1,280 x 960 (SXGA)		640 x 480 (VGA)	
Unit Cell size (H x V)	4.4 µm x 4.4 µm		3.75 µm x 3.75 µm		7.4 µm x 7.4 µm	
Minimum illumination	2 lx	20 lx	2 lx	20 lx	2 lx	20 lx
	F1.4 Gain: +24dB	F1.4 Gain: +18dB	F1.4 Gain: +24dB	F1.4 Gain: +18dB	F1.4 Gain: +24dB	F1.4 Gain: +18dB
Bit length	Mono 8: 8bits/pixel	Raw 8: 8bits/pixel	Mono 8: 8bits/pixel	Raw 8: 8bits/pixel	Mono 8: 8bits/pixel	Raw 8: 8bits/pixel
	Mono 16: 10bits/pixel	Raw 16: 10bits/pixel	Mono 16: 10bits/pixel	Raw 16: 10bits/pixel	Mono 16: 10bits/pixel	Raw 16: 10bits/pixel
Lens mount	C mount					
Digital interface	IEEE1394b-2002 x2, bilingal (with fixing screw)					
Protocol	IIDC 1394-based Digital Camera Specification Version 1.31 compliant					
Transfer rate	800 / 400 Mbps					
Frame rate	15 fps		30 fps		90 fps	
Gain	Auto/Manual	Auto/Manual	Auto/Manual	Auto/Manual	Auto/Manual	Auto/Manual
	(0 to 24 dB)	(0 to 18 dB)	(0 to 24 dB)	(0 to 18 dB)	(0 to 24 dB)	(0 to 18 dB)
Electronic shutter	1/100,000 to16 s (Absolute value control possible)					
External trigger shutter	Edge detection (Mode 0), Exposure time setting by trigger width (Mode 1), Software trigger (IEEE1394 bus),					
	Bulk trigger, Sequential trigger, Trigger inhibition setting, Trigger/strobe delay setting					
Image Memory	16 MB					
Memory Chanel	15 sets					
Broadcast delivery of commands	Using IEEE1394 BUS, Camera software setting					
Functions	Partial scan, binning, LUT, 3x3 filter (For Black and white models), Optical filter (Colour model only), AWB (Colour model only)					
Power requirements	DC +8 to +30 V (from IEEE1394b 9pin cable or 12pin connector: 12pin : Priority)					
Power consumption	3W (+12 V)		2.8 W (+12 V)			
Dimensions	44 (W) x 33 (H) x 57.5 (D) mm (not including projecting parts)					
Mass	140 g					
Operation temperature	-5 to +45 °C					
Storage temperature	-30 to +60 °C					
Performance guarantee temperature	0 to +40 °C					
Operation humidity	20 to 80% (Non condensation)					
Storage humidity	20 to 95% (Non condensation)					
Vibration resistance	10 G (20 to 200 Hz)					
Shock resistance	70 G					
MTBF	56270Hrs (Approx. 6.4 years)		58260Hrs (Approx. 6.7 years)		57170Hrs (Approx. 6.5years)	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003: Class A, CE: EN61326, AS/NZ: EN55022, VCCI: Class A, MIC					
Supplied accessories	Lens mout cap (1), Operating Instructions (1)					

Spectral Sensitivity Characteristics

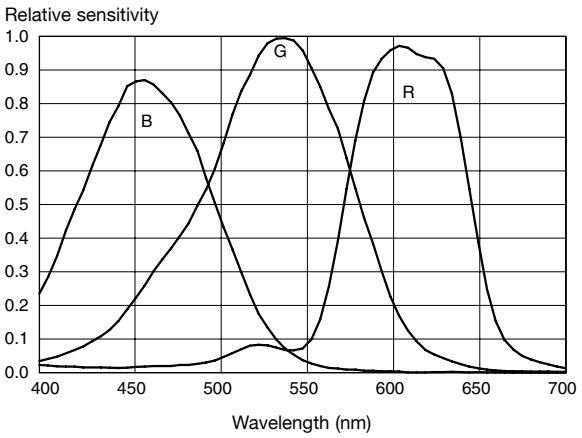
●XCD-V60

Spectral sensitivity (relative response) parameters
(without lens and light source parameters)



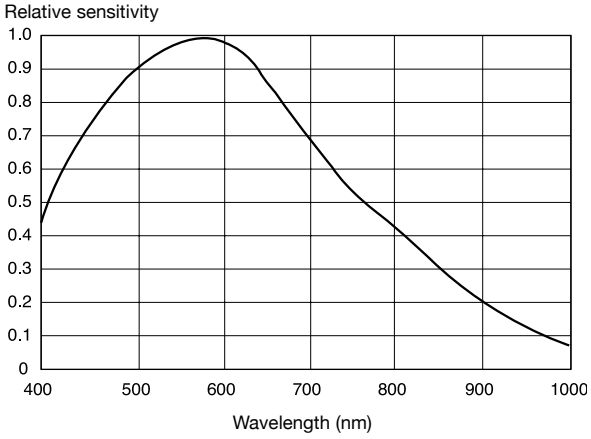
●XCD-V60CR

Spectral sensitivity (relative response) parameters
(without lens and light source parameters)



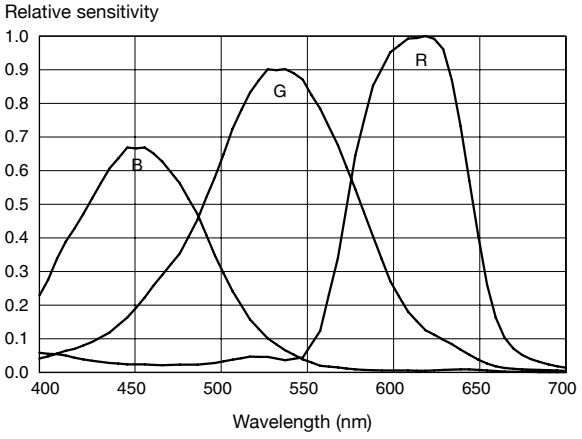
●XCD-SX90

Spectral sensitivity (relative response) parameters
(without lens and light source parameters)



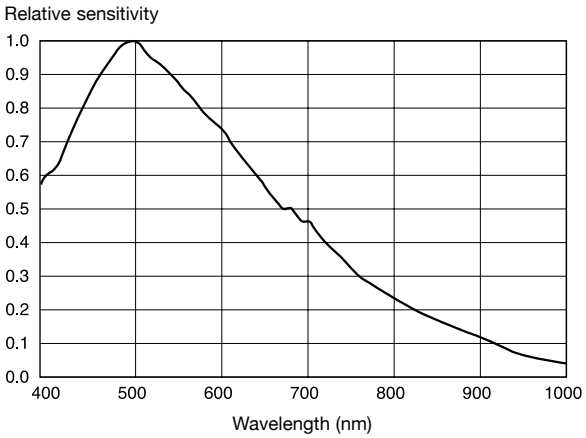
●XCD-SX90CR

Spectral sensitivity (relative response) parameters
(without lens and light source parameters)



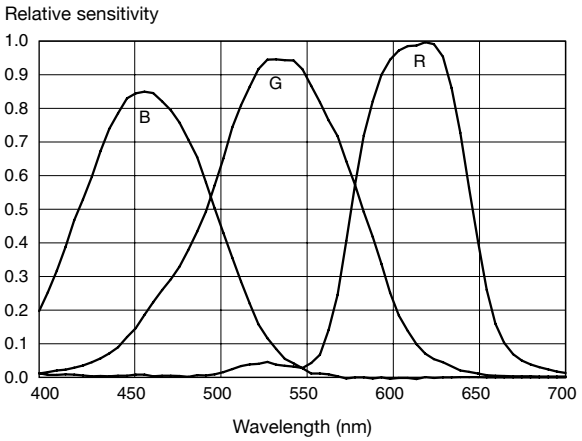
●XCD-U100

Spectral sensitivity (relative response) parameters
(without lens and light source parameters)

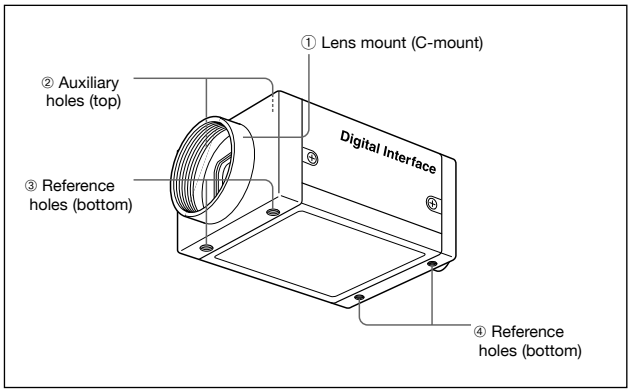


●XCD-U100CR

Spectral sensitivity (relative response) parameters
(without lens and light source parameters)



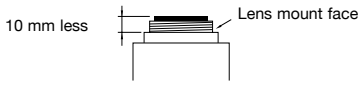
Location and Function of Parts and Controls



① Lens mount (C-mount)
Attach any C-mount lens or other optical equipment.

Note

The lens must not project more than 10 mm from the lens mount.

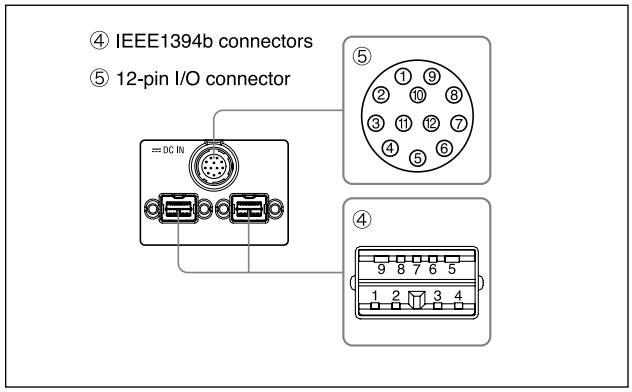


② Auxiliary holes (top)

③ Reference holes (bottom)
These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

Four screw reference holes ③ can be used as the tripod adaptor screw holes, too. Screw the VCT-ST70I tripod adaptor into the four screw holes when you use a tripod.

Rear and Connector Pin Assignments



④ IEEE1394b connectors
Connect an IEEE1394b camera cable (not supplied) to this connector.

Pin No.	Signal	Pin No.	Signal
1	TPB-	6	VG
2	TPB+	7	NC
3	TPA-	8	VP
4	TPA+	9	TPBG
5	TPAG		

⑤ 12-pin I/O connector
When power from the IEEE1394b connector is insufficient, power is supplied through this connector.
Connect a camera cable such as the CCXC-12P05N to this connector.

Pin No.	Signal	Pin No.	Signal
1	Power GND	7	GPIO IN 2
2	Power IN	8	GPIO OUT 2-
3	ISO GND	9	GPIO OUT 2+
4	Strobe OUT	10	GPIO IN 1
5	GPIO OUT 1-	11	Trigger IN
6	GPIO OUT 1+	12	ISO GND

GAIN

Both Manual and Auto Gain settings are available with this camera. The variable range extends from 0 to 24 dB for the black and white models or from 0 to 18 dB for the Colour models. The camera is designed so that the gain can be subdivided and set by 0.0359 dB. At the factory default setting, the gain is set to 0 dB. When Auto Gain is selected, the gain is adjusted automatically, based on the brightness of the subject. At this time, the reference level (target point) is set in the AutoExposure register.

Shutter

This camera allows both Manual and Auto Shutter settings.
The variable range extends from 10 microseconds to 16.0 seconds; relative values are indicated by a 12-bit integer, and absolute values are indicated using a 32-bit floating point value.

The relationship between the parameter and the exposure time is given by the following formulas, where:

P = Parameter (003h to 47Eh)
E = Exposure time (s)

If P= 3

$$E = 0.00001$$

If 4 <= P <= 1000

$$E = \frac{P^2}{1000000} \quad \text{①}$$

If 1000 <= P <= 1150

$$E = (P - 1000) \times 0.1 + 1 \quad \text{②}$$

Setting examples

3 (003h) : 10 µs (1/100000)
32 (020h) : 1 ms (1/1000)
100 (064h) : 10 ms (1/100)
1000 (3E8h) : 1 s
1010 (3F2h) : 2 s
1150 (47Eh) : 16 s

When Auto Shutter is selected, the exposure time is adjusted automatically, based on the brightness of the subject. At this time, the reference level (target point) is set in the AutoExposure register.

For long exposure times
When the exposure time is longer than the frame period, the camera enters the long exposure time mode, and the actual frame rate is reduced in accordance with the exposure time.

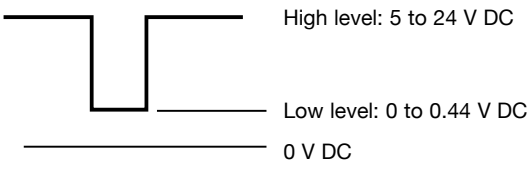
Trigger

Trigger shutter is useful for capturing images in response to a trigger that starts the exposure to match a preset timing. It can also be used to capture an image using multiple cameras with the same timing.
When a trigger shutter is used, the required trigger is input via the 12-pin connector on the rear panel. The input signal is a 5 to 24 V negative pulse.
As the input connector is pulled inside of the camera, the camera can receive a trigger only by short-circuiting the input pin and ISO (GND) pin.

Note

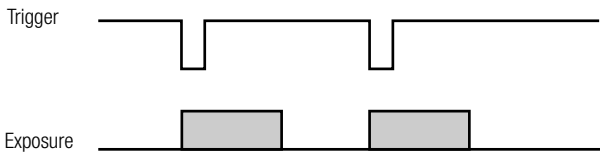
To connect to ground, use a device having a minimum pulse width of 10 microseconds and an input current of 0.5 mA or more.

This camera supports four trigger modes: 0, 1, 14 and 15.



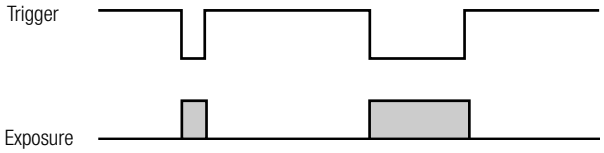
Trigger mode 0

Trigger mode 0 starts exposure by detecting the falling edge of a trigger signal. The exposure time is determined by the shutter parameter.



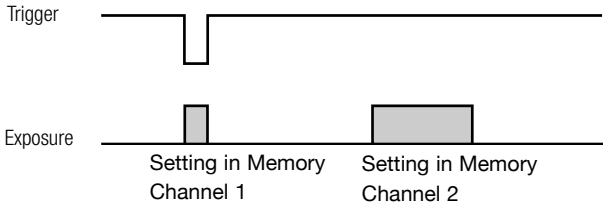
Trigger mode 1

Trigger mode 1 controls the exposure time using the width of the trigger signal pulse. When trigger mode 1 is used, there is actually no limit to the exposure time.



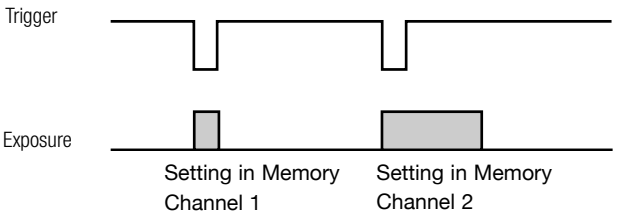
Trigger mode 14 (Bulk trigger mode)

Trigger mode 14 allows shooting of multiple images with different camera settings using only one trigger signal. The camera settings should be prestored in memory channels.



Trigger mode 15 (Sequential trigger mode)

Trigger mode 15 allows shooting of images by loading the camera settings prestored in memory channels in sequence each time a trigger is input.



As this camera is equipped with 15 memory channels, a repeat pattern of up to 15 image shootings can be set for trigger mode 14 or 15.
The number of the repeat patterns to be set in one cycle can be determined by the parameter of the trigger mode.
Memory channel 0 is not used for the Bulk trigger mode and the Sequential trigger mode.

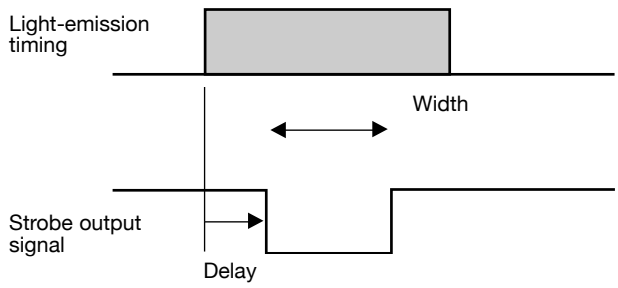
The following features are loaded from the memory to be set for shooting:
• Brightness • Sharpness • Saturation • White balance • Hue
• Gamma • Shutter • Gain • Pan/Tilt • Optical Filter

Note that the Auto mode of White Balance, Shutter and Gain cannot be set.
Also note that Pan/Tilt is set only when the current video mode is the same as the video mode selected when the setting has been stored in the memory channel.

This camera can also be used with a software trigger that issues the trigger signal via software command. Trigger modes 0, 1, 14 and 15 can be used with software triggers.

Strobe Control

A strobe control signal is assigned in the 12-pin connector. This allows direct command of light-emission from the strobe connected to the camera and controls the light-emission timing and the signal width.
The output terminal is of the open-collector type and should be pulled at the strobe side. A strobe that emits light by short-circuiting the input to ground can be connected to the camera directly.



Note

Use the following conditions:
Recommended pull-up resistor: 4.7 kΩ
Recommended pull-up voltage: 5 V

The camera is equipped with a protective resistor of 220Ω. If the above conditions prove difficult in use, check the output voltage and determine the external pull-up resistor. The camera is capable of outputting a signal of about 10 microsecond width, although the rise time depends on the pull-up resistor.

Saturation (Colour models only)

This feature controls the Colour density.

White Balance (Colour models only)

This feature controls the white balance by setting the R and B levels relative to the G level.
The camera also supports the Auto white balance by which the camera automatically adjusts the white balance.

Optical Filter

You can change the Bayer patterns by moving the starting position from which to output pixel data by one position up, down, right, or left.

Patterns of Bayer arrangement are as follows:

Pattern 0

G	B
R	G

Pattern 1

B	G
G	R

Pattern 2

R	G
G	B

Pattern 3

G	R
B	G

Memory Shot

The camera is equipped with Memory Shot that temporarily stores an image in the frame memory inside the camera and transfers it later.

When multiple cameras are connected in the same bus, all the cameras may not output images at the same time due to the restriction of 800 Mbps band. Memory Shot may resolve this inconvenience.

When exposure starts, each camera stores an image in the frame memory without allocating the isochronous resource.
When outputting, each PC outputs the image from the camera allocating the isochronous resource.
The number of images to be stored depends on the video mode.

Broadcast Command

The normal1394 communication method specifies the node number at the host side so that only a specified camera responds to the command.
If the node number is set to 63, all the cameras connected to the same bus can receive the command simultaneously, i.e., only one command issued from the host can control multiple cameras at the same time.
All the commands including the video mode setting and the feature control are capable of broadcasting except the block writing command.
When setting different types of cameras using a broadcast command, be careful not to issue a command that the cameras do not support.

1394 Bus Synchronization

Timing used to start exposure is synchronized with the 1394 bus time cycle register.
If cameras are connected to the same bus, they are automatically synchronized in a 1394 bus operation. As 800 Mbps band restriction can affect the synchronization, you must set the video mode in which the cameras can transmit a video signal at the same time.
1394 synchronization does not work in long exposure mode and Partial scan mode. In a long exposure, the exposure time is set longer than the image transmission cycle.

1394 bus synchronization includes up to 1H cycle jitter. Hardware external synchronization will ensure greater accuracy.

XCL-5000 (B/W) NEW
XCL-5005 (B/W) NEW
XCL-5005CR (Colour) NEW

CL Output | 2/3 Type CCD | Progressive Scan *1 | Square Pixels *1 | C Lens Mount *1 | 5 MEGA Output | Partial Scan *2 | Long Exposure *1

Normal Shutter | Mode 2 (Reset Mode) External Trigger Shutter | One-Push White Balance | Fixed White Balance | Manual White Balance | RS232C Control | B/W | RGB / RAW

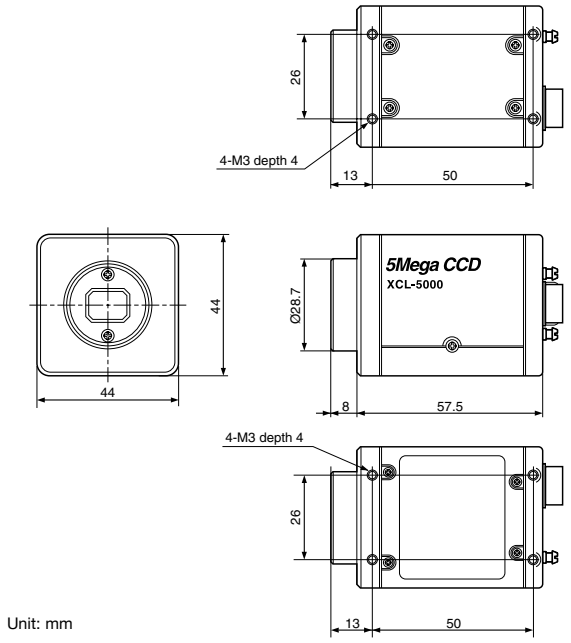
*1:XCL-5005CR
*2:XCL-5005, XCL-5000

Connection Diagram P34

Outline

The XCL-5000 is monochrome camera module with a 2/3 type 5-megapixel CCD and a compact Camera Link connector. The new XCL-5005 series of cameras are based on the XCL-5000 concept. Like the XCL-5000, XCL-5005 series cameras incorporate a 5-megapixel 2/3 type CCD that produces detailed images. The XCL-5005 is a monochrome camera, while the XCL-5005CR outputs 24-bit RGB or RAW Colour data that enables true Colour reproduction. Both models are compatible with the compact Camera Link standard (non-PoCL)/PoCL*, are equipped with EIAJ 12-pin connectors, and feature a selectable power supply (12-pin power supply has priority). The cameras are equipped with new functions such as selectable image output for various bit lengths, as well as hardware-based pre-processing functions and partial scan function, which are found only on digital cameras. High resistance to shock and vibration makes these camera modules ideal for machine vision and other applications that require high-definition image reproduction.
*PoCL (Power over Camera Link)

Dimensions



Unit: mm

Features

XCL-5000series

- 2/3-type 5 Mega pixel CCD
- Effective picture elements: 2456 (H) X 2058 (V)
- Frame rate: 15fps
- Partial scan function (Vertical random read scan)
- Normal /External trigger shutter
- C mount
- High Shock and Vibration Resistance
- RS-232C Control

XCL-5000/5005

- Read mode: Normal/Binning
- Outline detection, Outline Emphasis
- Binarization
- 3X3 pixel matrix operation
- Flip-Flop (XCL-5005 only)

XCL-5005CR

- One-push white balance function
- Switching Colour output (RAW Colour or RGB)
- Colour Bar Chart

XCL-5005seires

- CameraLink: Standard (non-PoCL) /PoCL
- Switching an Output tap (1TAP/2TAP)
- Various mode setting
  - Shutter speed
  - Gamma
  - Partial scan

Digital output CameraLink Base Configuration

XCL-5000	1TAP 8/10/12bit 80MHz
XCL-5005	1TAP 8/10/12bit 80MHz
XCL-5005CR	2TAP 8/10/12bit 40MHz
XCL-5005CR	1TAP 24bitRGB 80MHz

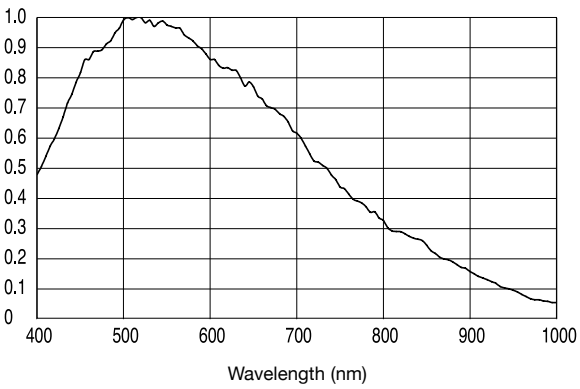
* PoCL : (Power Over Camera Link)

Accessories

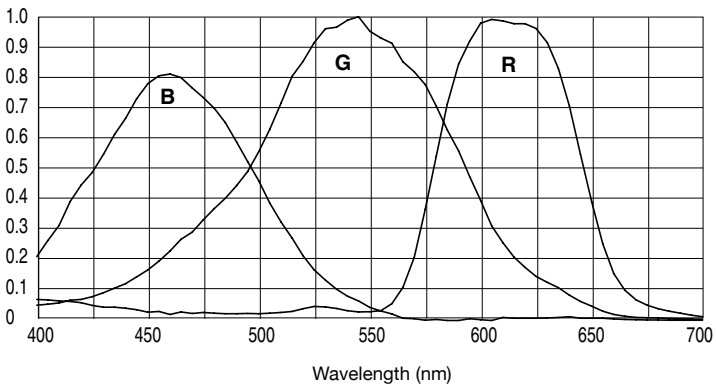
- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-ST70I

Spectral Sensitivity Characteristics

●XCL-5000/XCL-5005



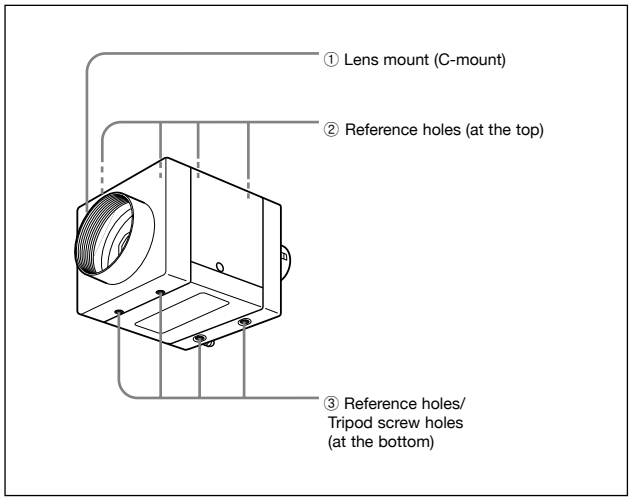
●XCL-5005CR



Specifications

	XCL-5000	XCL-5005	XCL-5005CR
Type	B/W	B/W	Colour
Image device	2/3 type Progressive Scan IT transfer CCD		
Effective picture elements (H x V)	2456 (H) x 2058 (V)		
Effective lines (H x V)	2448 (H) x 2050 (V)		
Cell size	3.45 (H) µm x 3.45 (H) µm		
Lens mount	C mount		
Sync system	Internal		Digital output
Video output	LVDS 12 bits/10 bits/8 bits switching		RAW data/RGB data switching, RAW data: LVDS 12 bits
			/10 bits/8 bits switching, RGB data:LVDS R/G/B 8 bits
Reference video output level	3760 steps (12bits)		
Reference pedestal level	240 steps (12bits)		
Output data clock	15 Hz		
Sensitivity	400 lx F5.6 (0 dB)		2000 lx F5.6 (0 dB)
Minimum illumination	1 lx (GAIN +18dB, F1.4)		8 lx (GAIN +18dB, F1.4)
Gain	0 to +18 dB		
Gamma	OFF/ON (Mode 0 to 5)	OFF/ON (Mode 0 to 7)	
Read mode	Normal/Bining/Partial scan		Normal/Partial scan
Frame rate	15 fps		
Output data clock	1Tap: 80 MHz	1Tap: 80 MHz/2Tap: 40 MHz 1Tap/ 2Tap switching	
		(However, only 1TAP when RGB data output of XCL-5005CR)	
Shutter mode	Normal/External trigger shutter		
Normal shutter speed	2 to 1/10,000s		
External trigger shutter	2 to 1/10,000s		
Partial Scanning	ON/OFF (Vertical 16 Zone)	ON/OFF	ON/OFF
		(Starting Position: per 5 lines, Area: per line)	(Starting Position: per 10 lines, Area: per 2 lines)
Bining	Vertical (1 x 2)		-
White balance	-		PRESET/MANUAL/ONE PUSH (AUTO)
Signal output	DVAL/EXPOSURE/GND output (selectable)		
Edge detection, Edge emphasis	yes		-
Binarize	yes		-
Matrix	yes		-
Power requirements	12V DC (Range: +10.5 to 15V with DC IN connector)	12V DC (Range: +10.5 to 15V with DC IN connector/digital interface connector)	
Power consumption	3.6 W	3.8 W	
Dimensions (W x H x D)	44 (W) x 44 (H) x 57.5 (D) mm		
Mass	Approx 135g	Approx 130g	
Operating temperature	-5 to +45 °C		
Storage temperature	-30 to +60 °C		
Performance guarantee temperature	0 to +40 °C		
Operating humidity	20 to 80 % (no condensation)		
Storage humidity	20 to 95 % (no condensation)		
Vibration resistance	10 G (20 Hz to 200 Hz, 20 minutes for each direction-X, Y, Z)		
Shock resistance	70 G		
MTBF	67,900Hrs (approx. 7.75years)	75,300Hrs (approx. 8.6 years)	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003 : Class A, CE : EN61326, AS/NZ : EN61326, VCCI : Class A, MIC		
Supplied accessories	Lens mout cap(1) Operationg Instructions(1)		

Location and Function of Parts and Controls

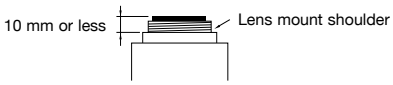


① Lens mount (C-mount)

Attach any C-mount lens or other optical equipment.

Note

The lens must not project more than 10 mm from the lens mount.

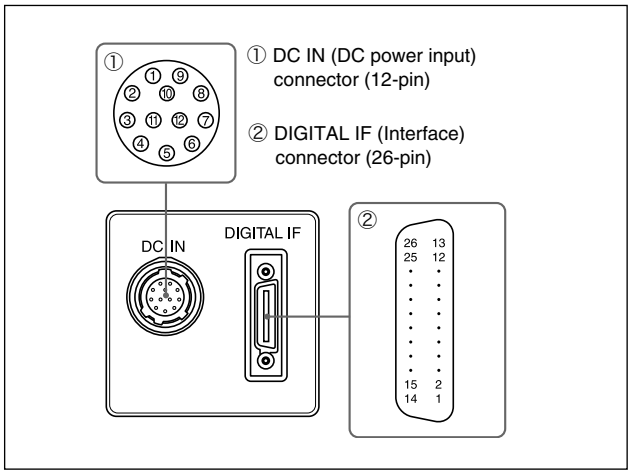


② Reference holes (at the top)

③ Reference holes/Tripod screw holes (at the bottom)

These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment. You can install the camera on a tripod. To install on a tripod, you will need to install a tripod adaptor VCT-ST70I to the camera on the reference holes. 10 mm or less Lens mount shoulder.

Rear Panel



① DC IN (DC power input) connector (12-pin)

You can connect a CCXC-12P05N camera cable to input the +12 V DC power supply. If you use a camera module interface board with support for PoCL, you can operate the camera without using this connector. The pin configuration of this connector is as follows.

② DIGITAL IF (Interface) connector (26-pin)

You can connect a CameraLink cable to this connector to control a camera module from a host device utilizing the serial communication protocol while outputting a video signal from the camera module. If you use a camera module interface board with support for PoCL, you can also supply power from this connector. You can input the external trigger signal via the 26-pin connector and operate a camera module in the external trigger mode. The pin configuration of this connector is as follows.

Note

When you operating a camera module by inputting an external trigger signal via the 26-pin connector, make sure to input external trigger signal that meet the following specifications to both the two pins.

Connector Pin Assignments

DC IN (DC Power input) 12-pin connector

Pin No.	Signal	Pin No.	Signal
1	Ground	7	NC
2	+12 V DC	8	Ground
3	Ground	9	NC
4	NC	10	Signal* output
5	Ground	11	Trigger pulse input
6	NC	12	Ground

* Signal output from the Tenth pin of *12 pins connector.
You can select one of the following signals according to the setting.
Ground/DVAL output/Exposure pules output The default setting in the factory is Ground.

DIGITAL IF (Interface) connector (26-pin)

Camera Link Base Configuration: 1tap

Pin No.	Digital signal	Pin No.	Digital signal
1	Power supply or Ground*	14	INNER_SHIELD (Ground)
2	X0 - output (Signal)	15	X0+ output (Signal)
3	X1 - output (Signal)	16	X1+ output (Signal)
4	X2 - output (Signal)	17	X2+ output (Signal)
5	XCLK - output (Signal)	18	XCLK+ output (Signal)
6	X3 - output (Signal)	19	X3+ output (Signal)
7	Ser TC+ (Signal)	20	Ser TC - (Signal)
8	Ser TFG - (Signal)	21	Ser TFG+ (Signal)
9	TRIG - input (Signal)	22	TRIG+ input (Signal)
10	NC	23	NC
11	NC	24	NC
12	NC	25	NC
13	INNER_SHIELD (Ground)	26	Power supply or Ground*

* The connection differs depending on the type of camera module interface board you use.
In the case of PoCL support: Both the 1 st pin and 26 th pin are POWER (Power supply)
In the case of non PoCL support: Both the 1 st pin and 26 th pin are INNER_SHELD (Ground)

Controlling the camera from the host device

You can control the camera from host device such as a PC.
The following table shows the control functions.

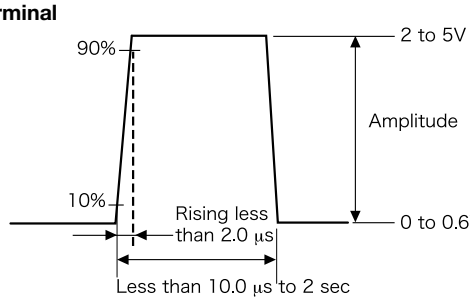
Control functions		XCL-5000	XCL-5005	XCL-5005CR
Operating mode		Normal/Trigger		
Shutter speed	Normal	2 to 1/10000s		
	Trigger	Trigger edge: 2 to 1/10000s		
		Trigger puls width: Setting by trigger pulse widht		
Gain		0 to +18 dB		
Binning		OFF/ON		-
Partial Scan		OFF/ON		
Edge detection, Edge emphasis		OFF/ON		-
Binarization		OFF/ON		-
Gamma control		OFF/ON (mode1 to mode 7)		
3x3 Image filtering		OFF/ON		-
Video output switch		12 bits/10 bits/ 8 bits		
External trigger input		26 pin connector/ 12 pin connector		
Switch output tap		1 Tap	1 Tap/ 2Tap	
White balance		-		RESET/MANUAL/
				ONE PUSH(AUTO)
Switch Colour output		-		RAW data/ RGB data

Note

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting a trigger signal. If you input external signals to a camera module without the power supplied, this may cause a malfunction of the camera module.

Trigger signal specifications

DC IN terminal



Input Impedance: Stated in the voltage determined at more than 10k ohms.

DIGITAL IF terminal

Convert the signal which meets the specifications above into LVDS format (3.3V power drive IC output), and inputs the converted signal.

Specification for the External Trigger Signal

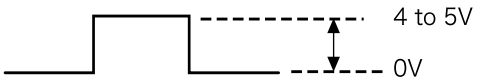
Amplitude : LVDS using 3.3 volt IC
Connections : Input a TRIG (-) signal to the 9th pin
: Input a TRIG (+) signal to the 22nd pin

Note that the signal level cannot be recognized correctly by the camera if it does not meet the following conditions.

H level: 1.5 V to 1.7V
L level: 0.8 V to 1.0V

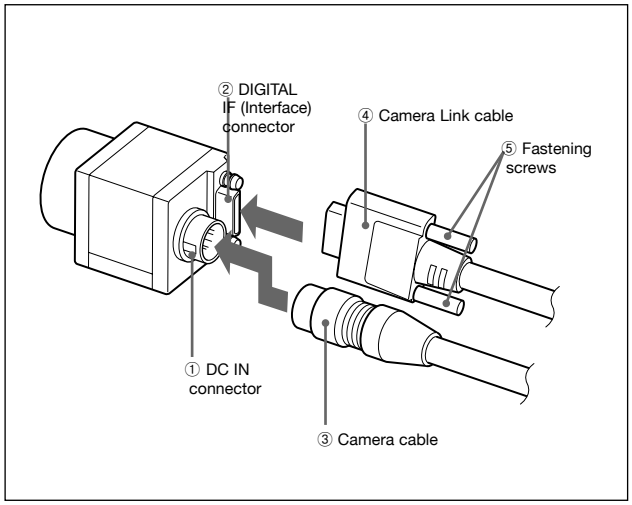
Polarity: positive

DVAL/Exposure output specific (only DC IN terminal)



Stated in the voltage of when terminating at more than 10k ohms.

Connecting the cables



① DC IN Connector
② DIGITAL IF (Interface) Connector
③ Camera Cable
④ Camera Link Cable
⑤ Fastening Screws

Connect the Camera cable to the DC IN connector and the Camera Link cable to the digital Interface cable respectively. If you use a camera module interface broad with support for PoCL, you can operate the camera even it connect the Camera Link cable, turn the two fastening screws on the connector to secure the cable tightly. Connect the other end of the Camera cable to the DC-700/700CE and the other end of the Camera Link cable to the camera module interface board.

XCL-U1000 (B/W)
XCL-U1000C (Colour)

CL Output | 1/1.8 Type CCD | Square Pixels | C Lens Mount | UXGA Output | Partial Scan | Long Exposure | Normal Shutter

Mode 2 (Non-Reset Mode) External Trigger Shutter | One-Push White Balance *2 | Fixed White Balance *2 | RS232C Control | Manual White Balance | B/W *1 | RGB *2

*1:XCL-U1000
*2:XCL-U1000C

Connection Diagram P35

Outline

Sony's new XCL Series equipped with a digital video interface that conforms to the Camera Link™ industry standard.
These new cameras enable the capture of high-speed, high resolution images while simplifying connectivity to machine-vision systems with its standard 3M MDR 26-pin cable.
The XCL-U1000 and XCL-U1000C cameras incorporate a 1/1.8-type progressive scan CCD that produce detailed, UXGA resolution images (1,600 x 1,200 pixels).
Sony's XCL Series of high-performance and feature-rich cameras is the ideal solution for today's wide range of machine vision applications.

Features

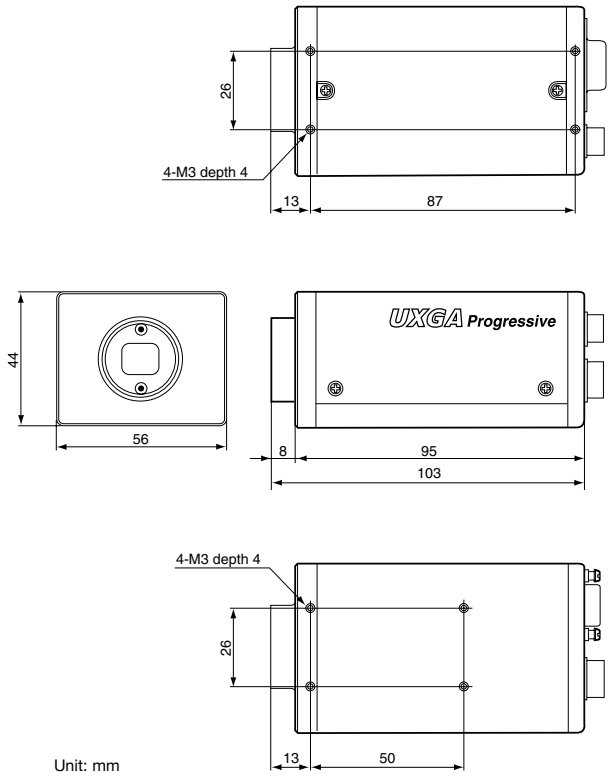
- 1/1.8-type progressive scanning CCD with square pixels
- UXGA image (1,600 x 1,200 pixels) captures video at 15 fps
- High sensitivity
  - XCL-U1000 : 400 lx at F 5.6
  - XCL-U1000C : 2,000 lx at F8
- Digital output
  - XCL-U1000 : LVDS 10 bit
  - XCL-U1000C : LDVS R/G/B 8 bit
- Camera Link standard conformity
- Monitor output
- External trigger shutter : 1/15 to 1/10,000 sec.
- C-mount lens
- Partial scanning
- Binning function (XCL-U1000)
- White balance (XCL-U1000C)
  - Auto/Manual/Preset selectable
- Matrix function for accurate Colour reproduction (XCL-U1000C)
- High shock and vibration resistance

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-ST70I

Dimensions

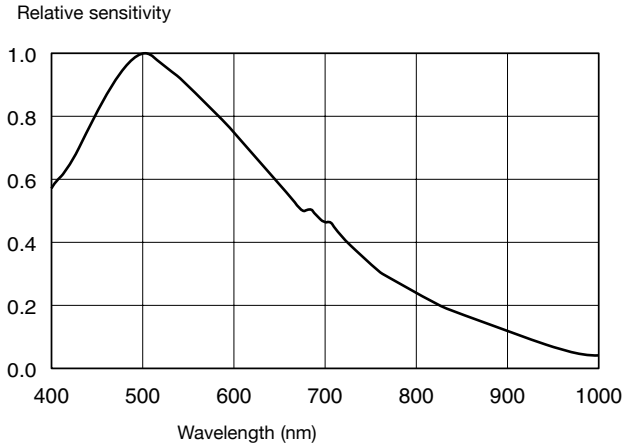
Camera body of all models



Unit: mm

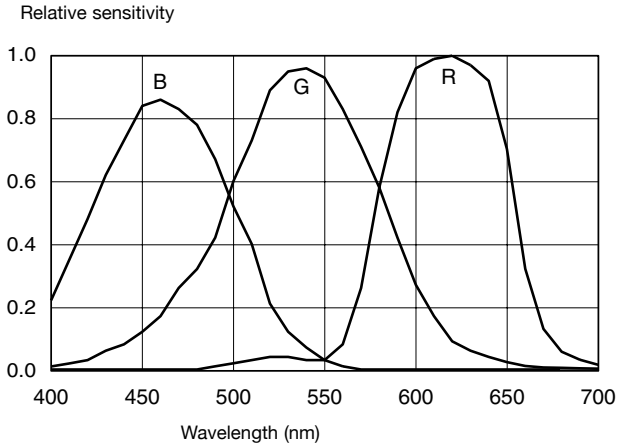
Spectral Sensitivity Characteristics

●XCL-U1000
(Typical Values)



(Lens characteristics and light source characteristics excluded.)

●XCL-U1000C
(Typical Values)

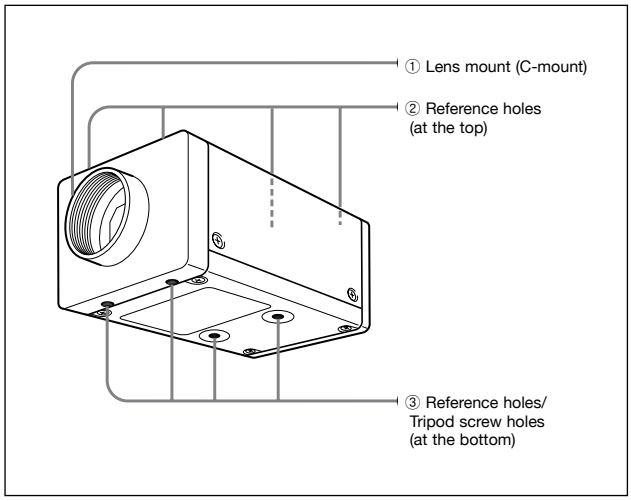


(Lens characteristics and light source characteristics excluded.)

Specifications

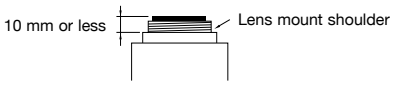
	XCL-U1000	XCL-U1000C
Type	B/W	Colour
Image device	1/1.8 type Progressive scan IT CCD	
Effective picture elements (H x V)	1628 (H) x 1236 (V)	
Effective lines (H x V)	1600 (H) x 1200 (V)	
Output image size	UXGA	
Cell size	4. 4(H) x 4.4 (V) µm	
Lens mount	C-mout	
Sync system	Internal	
Video output	Digital output	
Digital output	LVDS 10 bit	LDVS R/G/B 8bit
Reference video output level	940 steps	235 steps
Reference pedestal level	64 steps	16 steps
Monitor output (analog output)	Reference video output level: 700 mV HD frequency: 75 kHz positive	
	VD frequency: 60 Hz positive	
Output data clock	15 Hz	
Sensitivity	400 lx F5.6 (0 dB)	2000 lx F8 (0 dB)
Minimum illumination	2 lx (GAIN +18dB, F1.4)	4 lx (GAIN +18dB, F1.4)
Gain	0 to +18 dB	
Gamma	OFF/ON	
Read mode	Normal/Binning/Partial scan	Normal/Partial scan
Frame rate	15 fps	
Output data clock	36 MHz	
Shutter mode	Normal/External trigger shutter	
Normal shutter speed	1 to 1/10,000 s	
External trigger shutter	Edge detection mode: 1/15 to 1/10,000 s, Pulse width detection mode: 1 to 1/10,000 s	
High rate scan	ON/OFF (Vertical 1/16V to 15/16V)	
Bining	Vertical (1 x 2)	-
Detail	ON/OFF	ON/OFF
White balance	-	Pre-set/Manual/AWB
Matrix	-	ON/OFF
Power requirements	DC12 V	
Power consumption	5.5 W	
Dimensions (W x H x D)	56 (W) x 44 (H) x 95 (D) mm	
Mass	250 g	
Operating temperature	-5 to +45 °C	
Storage temperature	-30 to +60 °C	
Performance guarantee temperature	0 to +40 °C	
Operating humidity	20 to 80 % (no condensation)	
Storage humidity	20 to 95 % (no condensation)	
Vibration resistance	10 G (20 Hz to 200 Hz, 20 minutes for each direction-X, Y, Z)	
Shock resistance	70 G	
MTBF	49,059 hrs.	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003: Class A, CE: EN61326, AS/NZ: EN61326, VCCI: Class A	
Supplied accessories	Lens mout cap(1) Operationg Instructions(1)	

Location and Function of Parts and Controls



① **Lens mount (C-mount)**
Attach any C-mount lens or other optical equipment.

Note
The lens must not project more than 10 mm from the lens mount.

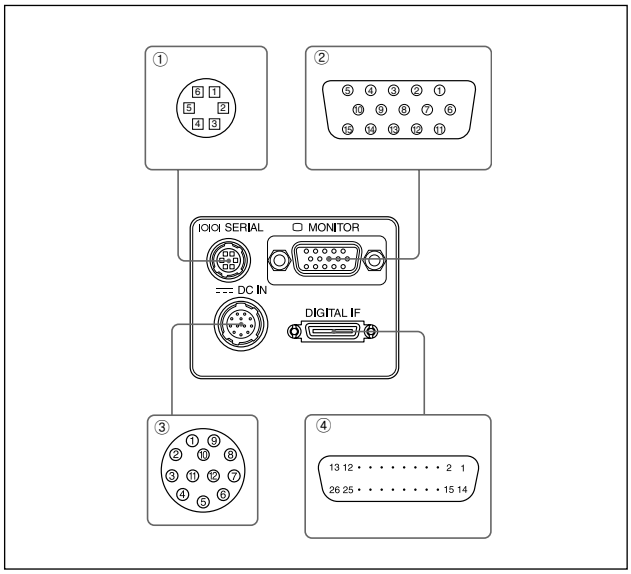


② **Reference holes (at the top)**

③ **Reference holes/Tripod screw holes (at the bottom)**
These precision screw holes are for locking the camera module. Locking the camera module into these holes secures the optical axis alignment.

You can install the camera on a tripod. To install on a tripod, you will need to install a tripod adaptor VCT-ST70I to the camera on the reference holes.

Rear Panel



① **RS-232C connector (6-pin)**
You can connect a senal cable to this connector to control a camera module from a camera control device.

② **Monitor output connector (15-pin)**
You can connect a monitor cable to this connector to display an image on a multiscan monitor supporting UXGA resolution.

Note
If you connect a multiscan monitor that does not support UXGA resolution, an image may not be displayed.

③ **DC IN (DC power input) connector (12-pin)**
You can connect a CCXC-12P05N camera cable to input the +12 V DC power supply. The pin configuration of this connector is as follows.

④ **DIGITAL IF (Interface) connector (26-pin)**
You can connect a digital interface cable to this connector to control a camera module from a host device utilizing the serial communication protocol while outputting a video signal from the camera module. You can input the external trigger signal via the 26-pin connector and operate a camera module in the external trigger mode. The pin configuration of this connector is as follows.

Note
When operating a camera module by inputting an external trigger signal via the 26-pin connector, be careful about trigger pulse input specifications (DIGITAL IF terminal).

Connector Pin Assignments

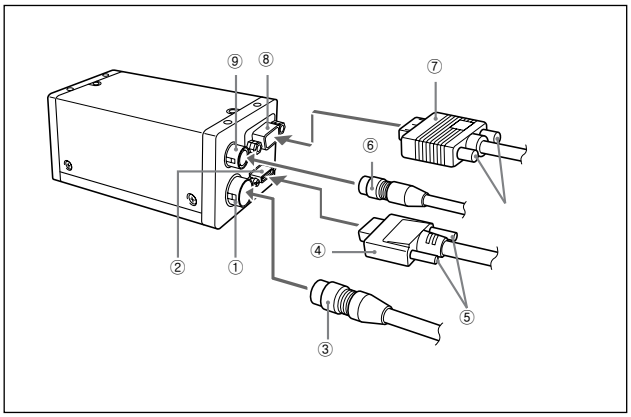
Pin No.	Signal	Pin No.	Signal
1	TXD	4	NC
2	RXD	5	NC
3	Ground	6	NC

Pin No.	Signal	Pin No.	Signal
1	R output	9	NC
2	G output	10	Ground
3	B output	11	NC
4	NC	12	NC
5	Ground	13	HD output
6	Ground	14	VD output
7	Ground	15	NC
8	Ground		

Pin No.	Signal	Pin No.	Signal
1	Ground	7	NC
2	+12 V DC	8	Ground
3	Ground	9	NC
4	NC	10	Exposure pulse output
5	Ground	11	Trigger pulse input
6	NC	12	Ground

Pin No.	Digital signal	Pin No.	Digital signal
1	INNER_SHIELD (Ground)	14	INNER_SHIELD (Ground)
2	X0- output (Signal)	15	X0+ output (Signal)
3	X1- output (Signal)	16	X1+ output (Signal)
4	X2- output (Signal)	17	X2+ output (Signal)
5	XCLK- output (Signal)	18	XCLK+ output (Signal)
6	X3- output (Signal)	19	X3+ output (Signal)
7	Ser TC+ (Signal)	20	Ser TC- (Signal)
8	Ser TFG- (Signal)	21	Ser TFG+ (Signal)
9	TRIG- input (Signal)	22	TRIG+ input (Signal)
10	NC	23	NC
11	NC	24	NC
12	NC	25	NC
13	INNER_SHIELD (Ground)	26	INNER_SHIELD (Ground)

Connecting the cables



① DC IN connector
② Digital interface connector
③Camera cable
④ Digital interface cable
⑤ Fastening screws
⑥ Serial cable
⑦ Monitor cable
⑧ Monitor output connector
⑨ RS-232C connector

Connect the camera cable to the DC IN connector and the digital interface cable to the digital interface cable respectively. Also, if needed, connect the monitor cable to the monitor output connector and the serial cable to the RS-232C connector respectively. When you connect the digital interface cable or monitor cable, turn the two fastening screws on the connector to secure the cable tightly.

Connect the other end of the camera cable to the DC-700/700CE and the other end of the digital interface cable to the camera module interface board. Also, if needed, connect the other end of the monitor cable to the monitor and the other end of the serial cable to the camera control device.

About the camera control method

You can control the camera from host device such as a PC. The following table shows the control functions.
You can send a command corresponding to the control items, with parameters for the desired settings, if necessary, from the host device to control the camera.
Refer to "Camera Control Command" on page 16 for details on how to send a command, the commands, and their parameters.

Control functions	Description	
Operating mode	Normal/Trigger	
Shutter speed	Normal	1 to 1/10000
	Trigger	Internal setting: 1/15 to 1/10000
		Setting by trigger pulse width
Gain	0 to +18 dB	
Binning function	OFF/ON	
Partial Scan function	OFF/ON	
Detail	OFF/ON	
External trigger input	26-pin connector / DC-700 / 700CE	
White balance	Preset/Manual/AWB	
(XCL-U1000C only)		
Matrix (XCL-U1000C only)	OFF/ON	

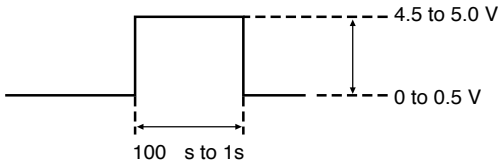
Note

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting a trigger signal. If you input external signals to a camera module without the power supplied, this may cause a malfunction of the camera module.

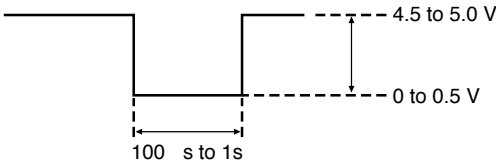
Trigger Pulse Input Specifications

DC IN terminal

(When positive pole is set)



(When negative pole is set)



• Input impedance: 10 kΩ or more

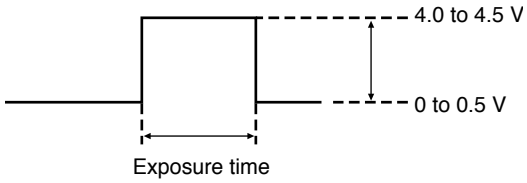
DIGITAL IF terminal

When operating a camera module by inputting an external trigger signal via the 26-pin connector, be sure to input trigger signals that satisfy the following specifications to both of the two terminals.

Trigger signal specifications (conditions)
Amplitude: LVDS (output by the 3.3 volt IC)
Connection: Input a TRIG (-) signal to the 9th pin
Input a TRIG(+) signal to the 22nd pin

Polarity: positive

Exposure Output Specifications (DC IN terminal only)



°C When terminated at 10 kΩ or more

Exposure output is output as a pulse that indicates exposure time when trigger mode is selected.

CCD DIGITAL CAMERA MODULE

XCL-X700
XCL-V500

CL Output | 1/3 Type CCD | Square Pixels | C Lens Mount | XGA Output *1 | VGA Output *2 | Partial Scan

HD VD External Sync | CLock External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter

*1:XCL-X700
*2:XCL-V500

Connection Diagram P35

Outline

Sony's new XCL Series equipped with a digital video interface that conforms to the Camera Link industry standard.
These new cameras enable the capture of high-speed, high resolution images while simplifying connectivity to machine-vision systems with its standard 3M MDR 26-pin cable.
The XCL-V500 and XCL-X700 cameras feature a 1/3-type progressive scan CCD that captures high quality black and white images at a high frame rate, designed in a compact and lightweight body.
Sony's XCL Series of high-performance and feature-rich cameras is the ideal solution for today's wide range of machine vision applications.

Features

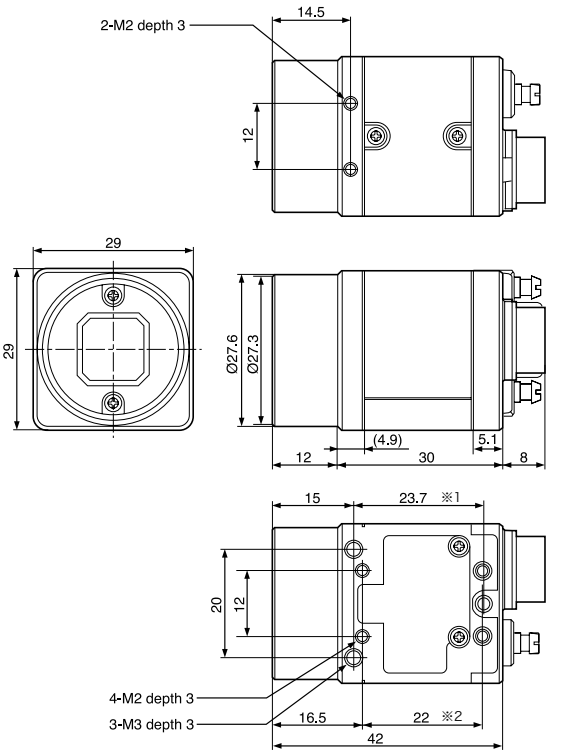
- 1/3-type progressive scanning CCD with square pixels
- High-rate scanning
  - XCL-X700: XGA image (1,024 x 768 pixels) captures video at 29.2 fps
  - XCL-V500: VGA image (648 x 494 pixels) captures video at 60 fps
- Effective picture element
  - XCL-X700: 1034(H) x 779(V)
  - XCL-V500: 659(H) x 494(V)
- High sensitivity
  - 400 lx at F 5.6
- Camera Link standard conformity
- Compact and lightweight
- External trigger shutter : 1/4 to 1/100,000 sec.
- Synchronization signal : Internal/external (HD/VD)
- C-mount lens
- Partial scanning
- Binning function
- High shock and vibration resistance

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-333I

Dimensions

Camera body of all models

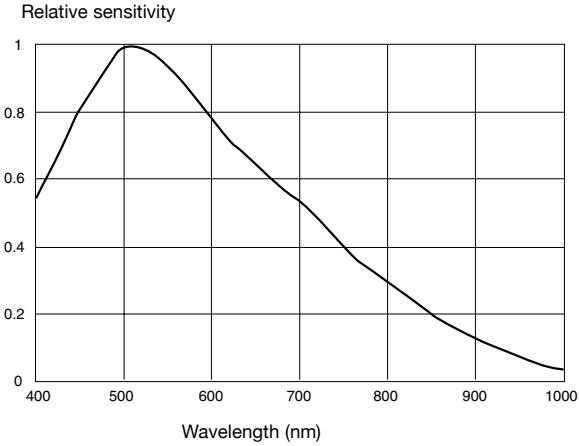


Unit: mm

*1: for 3-M3 screw
*2: for 4-M2 screw

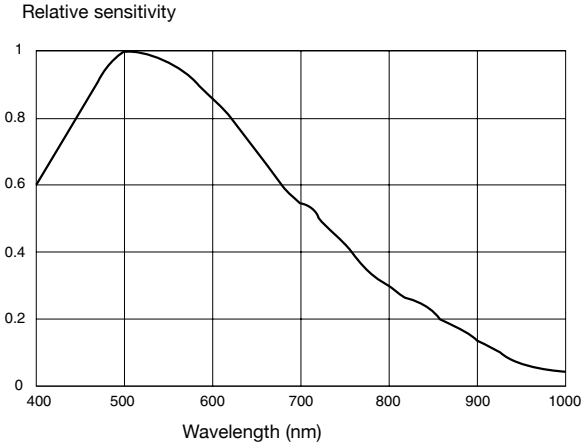
Spectral Sensitivity Characteristics

●XCL-X700
(Typical Values)



(Lens characteristics and light source characteristics excluded.)

●XCL-V500
(Typical Values)

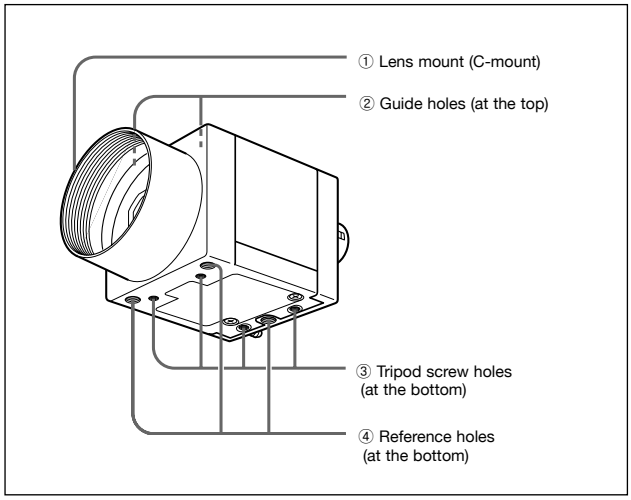


(Lens characteristics and light source characteristics excluded.)

Specifications

	XCL-X700	XCL-V500
Image device	1/3 type progressive scan IT CCD	
Effective picture elements (H x V)	1034(H) x 779(V)	659 (H) x 494 (V)
Effective lines (H x V)	1024 (H) x 768 (V)	648 (H) x 494 (V)
Output image size	XGA	VGA
Cell size	4.65 (H) x 4.65 (V) µm	7.4 (H) x 7.4 (V) µm
Lens mount	C-mout	
Synchronization	Internal/External (automatically switched according to input signal)	
External sync signal I/O	HD/VD (HD/VD level: 2 to 5 Vp-p)	
External sync sallowable frequency	±1% (horizontal sync frequency)	
H Jitter	Less than 20nsec (Internal clock)	
Video output	LVDS 10 bits	
Reference video output level	940 steps	
Reference pedestal level	64 steps	
White clip	1023 steps	
Output signal frequency	29.2 Hz (Internal clock, normal mode)	59.94 Hz (Internal clock, normal mode)
Horizontal resolution	800TV lines	500TV lines
Sensitivity	400 lx F5.6 (0 dB)	
Minimum illumination	1 lx (with the gain control at maximum, F1.4)	
Gain	0 to +18 dB	
Gamma	1 (fixed)	
Read mode	Normal/Bining/Partial scan	
Shutter mode	External trigger shutter	
Shutter speed	External trigger shutter: 1/4 to 1/100000 s	
Frame rate	29.2 fps	59.94 fps
Output data clock	29.5 MHz	24.55 MHz
High rate scan	ON/OFF	
Bining	Vertical +2Line	
Power requirements	+12V DC (Range: +10.5 to 15V)	
Power consumption	2.2 W	2.0 W
Dimensions (W x H x D)	29 (W) x 29 (H) x 30 (D) mm	
Mass	55 g	
Operating temperature	-5 to +45 °C	
Storage temperature	-30 to +60 °C	
Performance guarantee temperature	0 to +40 °C	
Operating humidity	20 to 80 % (no condensation)	
Storage humidity	20 to 95 % (no condensation)	
Vibration resistance	10G (20 Hz to 200 Hz, 20 minutes for each direction-X, Y, Z)	
Shock resistance	70G	
MTBF	73,880 hrs.	
Regulatory compliance	UL60950-1+CSA C22.2 No.60950.1, FCC/ICES-003: Class B, CE: EN61326, AS/NZ: EN61326, VCCI: Class B	
Supplied accessories	Lens mout cap(1) Operationg Instructions(1)	

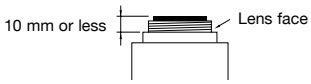
Location and Function of Parts and Controls



① **Lens mount (C-mount)**
Attach any C-mount lens, such as the VCL-12YM standard lens, or other optical equipment.

Note

Be sure that the lens does not project more than 10 mm from the lens mount.

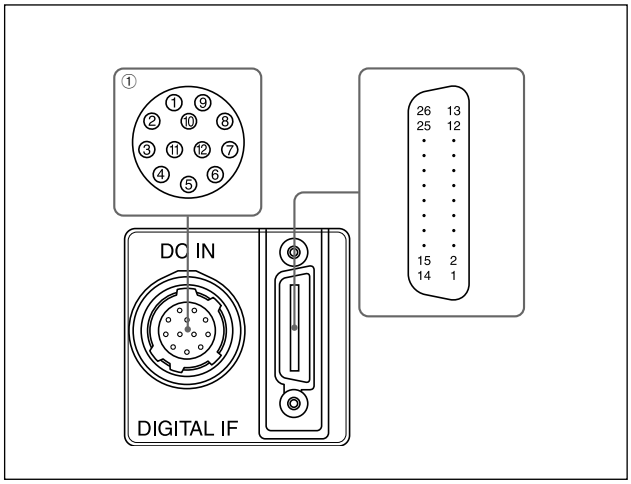


② **Guide holes (at the top)**
These screw holes help to lock the camera module.

③ **Tripod screw holes (at the bottom)**
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

④ **Reference holes (at the bottom)**
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Rear Panel



① **DC IN (DC power input) connector (12-pin)**
You can connect a CCXC-12P05N camera cable to input the +12 V DC power supply. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals. The pin configuration of this connector is as follows.

DIGITAL IF
(Interface) connector (26-pin)
You can connect a Camera Link cable to this connector to control a camera module from a host device utilizing the serial communication protocol while outputting a video signal from the camera module. You can input the external trigger signal/ external sync signal via the 26-pin connector and operate a camera module in the external trigger mode/external synchronization mode. The pin configuration of this connector is as follows.

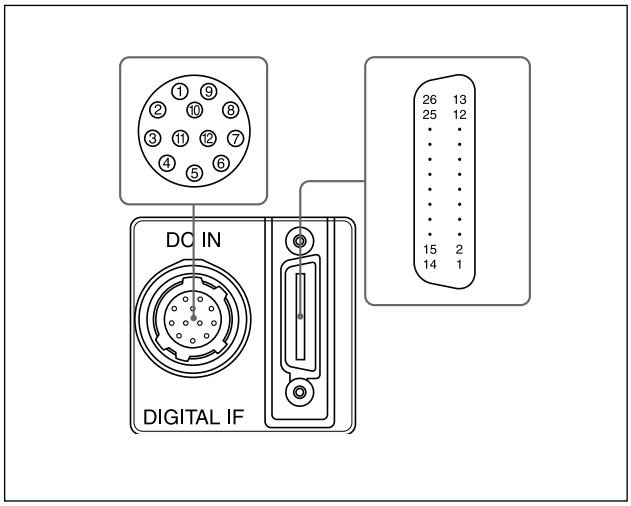
Note

When you operate a camera module by inputting an external trigger signal via the 26-pin connector, make sure to input external trigger signals that meet the following specifications to both the two pins.

Specifications for the External Trigger Signal
Amplitude: LVDS using a 3.3 volt IC Polarity: positive

Connections: Input a TRIG (-) signal to the 9th pin.
Input a TRIG (+) signal to the 22nd pin.

Connector Pin Assignments



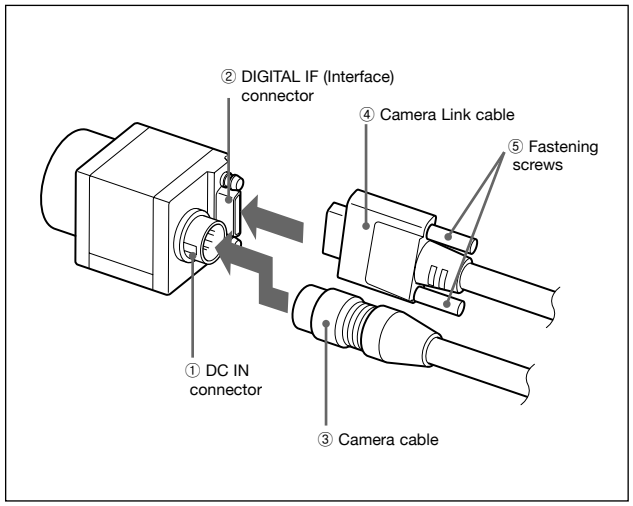
Pin No.	Camera sync output	External Sync mode (HD/VD)	Restart reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12 V DC	+12 V DC	+12 V DC	+12 V DC
3	—	—	—	—
4	Clock (+) input (Signal)	Clock (+) input (Signal)	Clock (+) input (Signal)	Clock (+) input (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	Clock (–) input (Signal)	Clock (–) input (Signal)	Clock (–) input (Signal)	Clock (–) input (Signal)
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)

Note

When you operate a camera module by inputting an external clock signal, input the external signal using the VIDEO connectors of the DC-700. Make sure to input external clock signals that meet the following specifications to both connectors.

Pin No.	Digital signal	Pin No.	Digital signal
1	INNER_SHIELD (Ground)	14	INNER_SHIELD (Ground)
2	X0- output (Signal)	15	X0+ output (Signal)
3	X1- output (Signal)	16	X1+ output (Signal)
4	X2- output (Signal)	17	X2+ output (Signal)
5	XCLK- output (Signal)	18	XCLK+ output (Signal)
6	X3- output (Signal)	19	X3+ output (Signal)
7	Ser TC+ (Signal)	20	Ser TC- (Signal)
8	Ser TFG- (Signal)	21	Ser TFG+ (Signal)
9	TRIG (-) input (Signal)	22	TRIG (+) input (Signal)
10	HD (+) input (Signal)	23	HD (-) input (Signal)
11	VD (-) input (Signal)	24	VD (+) input (Signal)
12	CLOCK (+) input (Signal)	25	CLOCK (-) input (Signal)
13	INNER_SHIELD (Ground)	26	INNER_SHIELD (Ground)

Connecting the cables



Connect the Camera cable to the DC IN connector and the Camera Link cable to the DIGITAL IF (Interface) connector respectively. When you connect the Camera Link cable, turn the two Fastening screws on the connector to secure the cable tightly.
Connect the other end of the Camera cable to the DC-700/700CE and the other end of the Camera Link cable to the camera module interface board.

About the camera control method

You can control the camera from host device such as a PC.
The following table shows the control functions.
You can send a command corresponding to the control items, with parameters for the desired settings, if necessary, from the host device to control the camera.

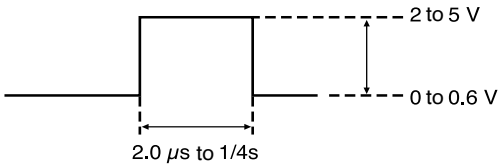
Control functions	Description	
Operating mode	Normal/Restart reset/trigger mode 1/trigger mode 2	
Shutter speed	Normal	XCL-X700: OFF (1/29.2) to 1/20000
		XCL-V500: OFF (1/60) to 1/30000
	Trigger	Internal setting: OFF (the same as above) to 1/100000
		Setting by trigger pulse width
Gain	0 to +18 dB	
Binning function	OFF/ON	
Partial Scan function	OFF/ON	
HD/VD signal I/O signal output	External sync signal input / Internal sync	
External trigger input	26-pin connector / DC-700/700CE	
75 Ω termination	ON/OFF	
Master clock	Internal / External	

Note

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting a sync or trigger signal. If you input external signals to a camera module without the power supplied, this may cause a malfunction of the camera module.

Trigger Pulse Specifications

DC IN connector

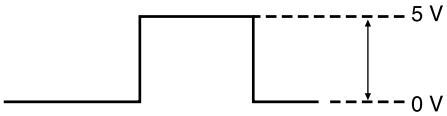


The voltage measuerd when the input impedanced is 10 kΩ or more

DIGITAL IF connector

Input signals meeting the input specifications above converted to the signal level of the LVDS system (output by the 3.3 V IC). Be aware that if the signals fail to meet the following conditions, the camera module will not recognize the input signals properly.
H level: 1.5 V to 1.7 V
L level: 0.8 V to 1.0 V

WEN Output Specifications (only for the DC connector)

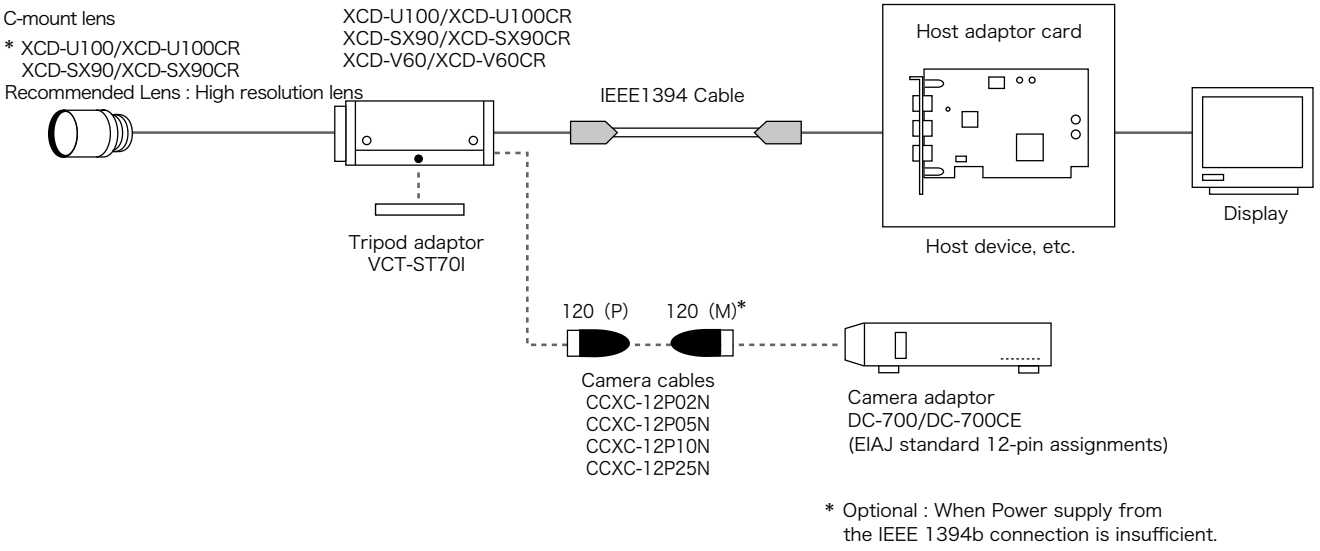


The voltage measuerd when terminated with 10 kΩ or more

Output WEN signals synchronized with the falling edge of Internal-VD, corresponding to the start of video signal output in Trigger Mode1/2.

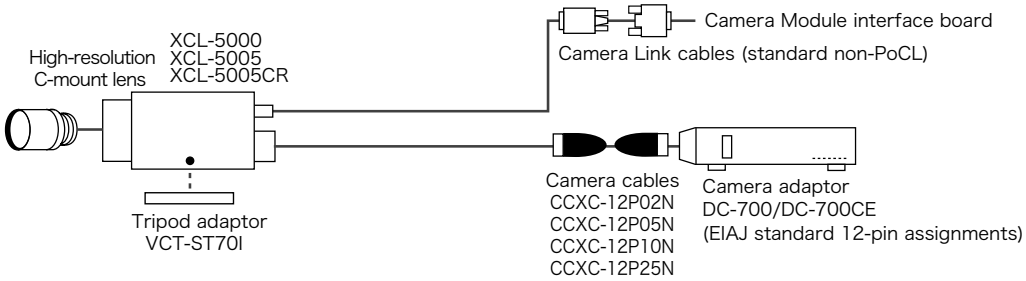
Connection Diagram

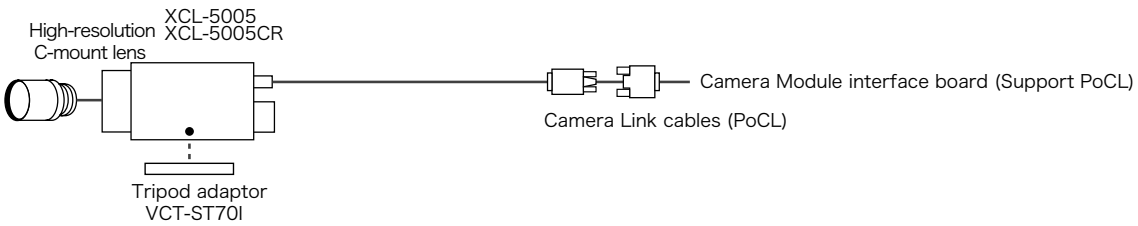
XCD Series



* Optional : When Power supply from the IEEE 1394b connection is insufficient.

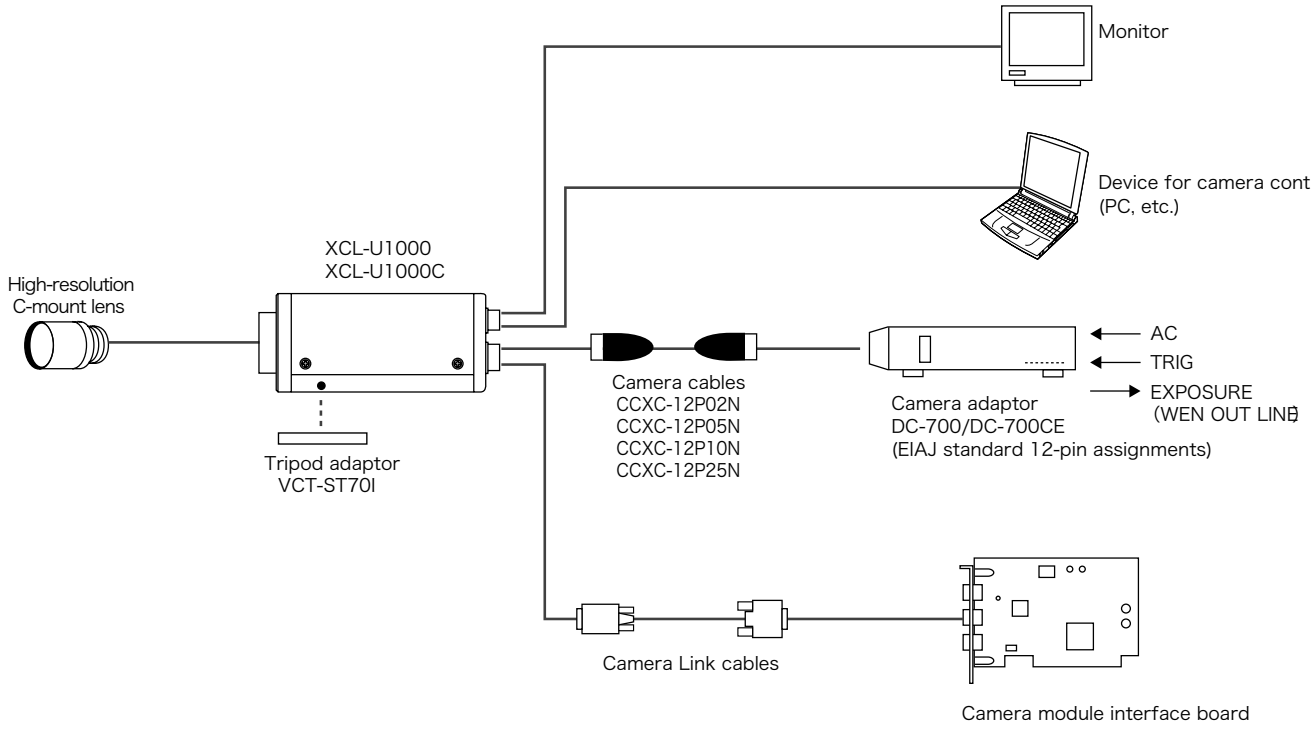
XCL-5000/5005/5005CR



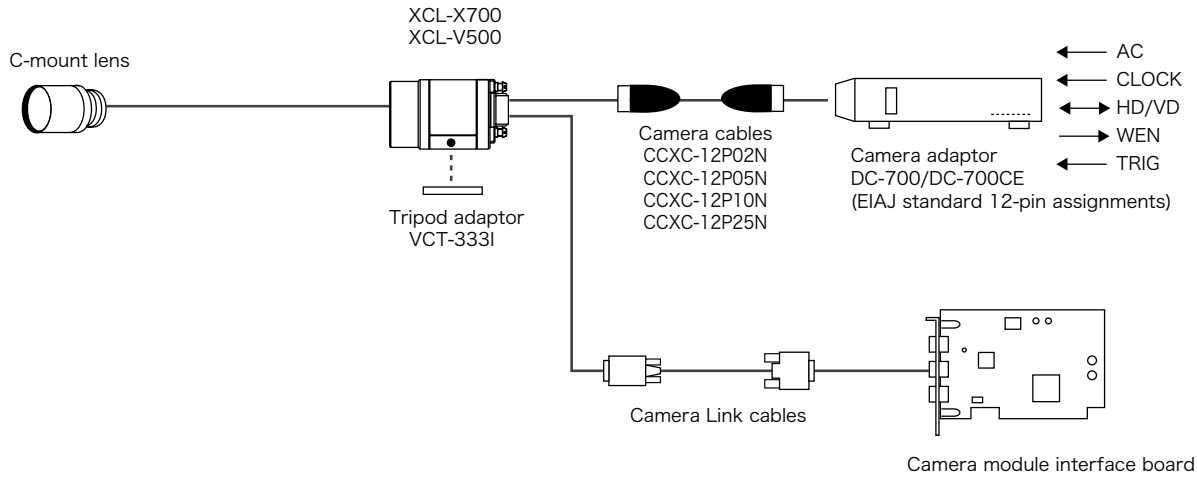


Connection Diagram

XCL-U1000/XCL-U1000C



XCL-X700/XCL-V500



HIGH RESOLUTION B/W CAMERA MODULE

XC-HR90

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | C Lens Mount | SXGA Output | Partial Scan
HD VD External Sync | 30/15 fps Selectable | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter | Restart Reset | Long Exposure | RS232C Control

SXGA High Frame Rate | PS

Connection Diagram P60

Outline

The XC-HR90 is an analog interface camera with high-speed, high-quality picture output of approximately 1.25 megapixels (SXGA) at a standard frame rate of 30 fps, with a compact size that makes it ideal for use in combination with industrial equipment.
Other features include a partial scan function that enables faster image read-out, and settings that can be made via the rear panel or remotely via RS-232C serial interface.

Features

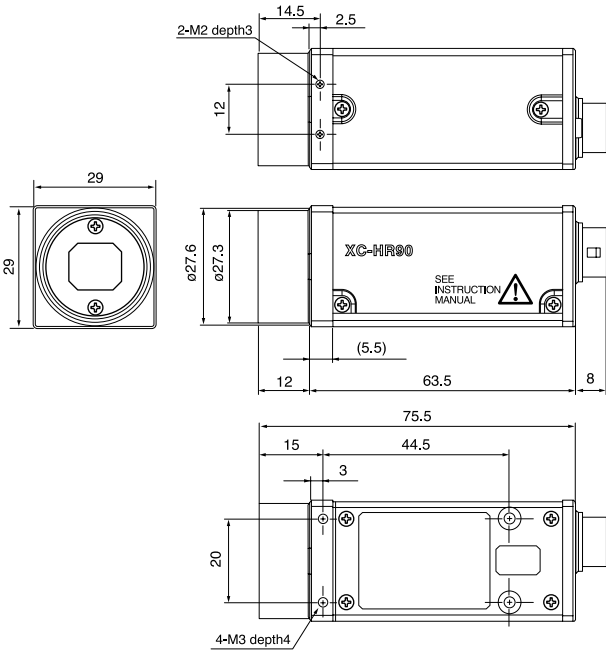
- 1/3 type high-resolution progressive scan CCD monochrome camera module
- Full pixel read-out, SXGA size
  (Effective lines: 1280 (H) x 960 (V))
  Image output: 30 fps, 15 fps (selectable)
- Vertical frequency
  49.302 MHz (30 fps)
  24.651 MHz (15 fps)
- Analog output
- Partial scan function
- Binning function
- External control possible (RS-232C)

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-55I

Dimensions

Camera body of all XC-HR models

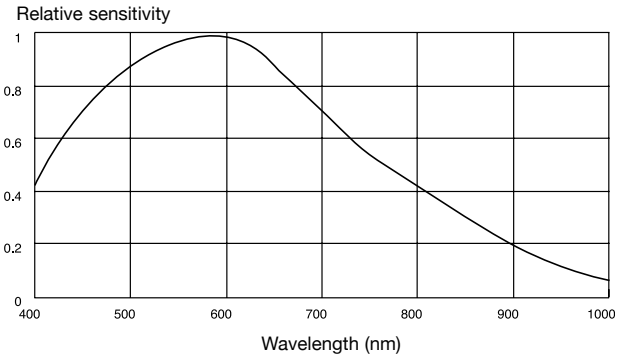


*1: for 3-M3 screw
*2: for 4-M2 screw

Unit: mm

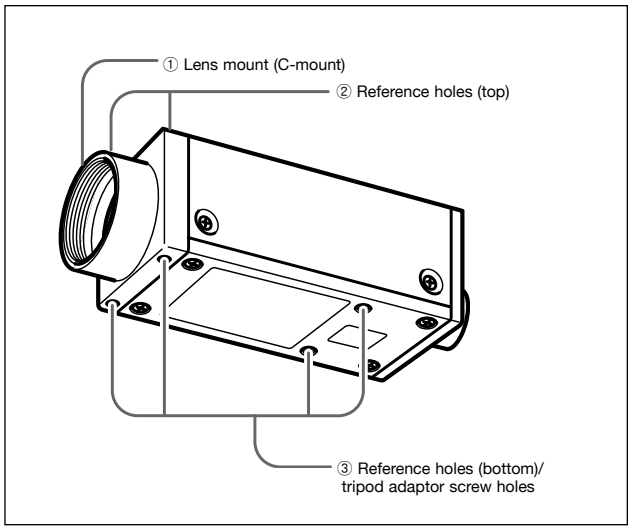
Spectral Sensitivity Characteristics

●XC-HR90
(Typical Values)



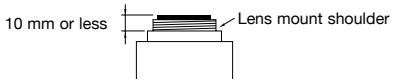
(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls



① Lens mount (C-mount)
Attach any C-mount lens or optical equipment suitable for high-resolution images (SXGA-compatible).

Note
Be sure that the lens does not project more than 10 mm from the lens mount.



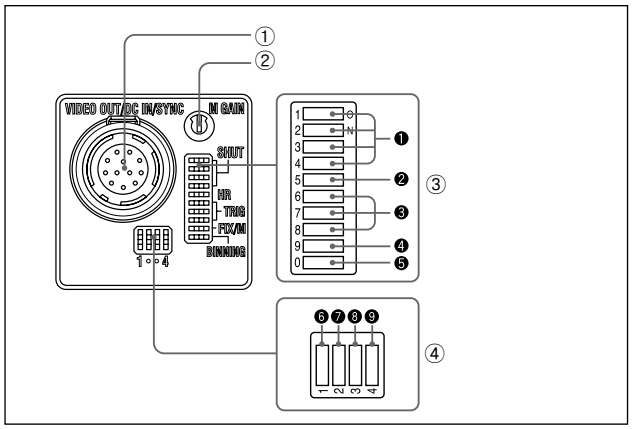
② Reference holes (top)

③ Reference holes/ tripod screw holes (bottom)
These precision screw holes are for locking the camera module. Using these holes to lock the camera module secures the optical axis alignment.
The reference screw holes can also be used as tripod adaptor screw holes. To install on a tripod, attach the VCT-551 tripod adaptor using these four screw holes.

Specifications

	XC-HR90
Image device	1/3 type progressive scan IT CCD
Effective picture elements	1,296 (H) x 966 (V)
Effective lines	1,280 (H)) x 960 (V)
Image size	SXGA
Unit cell size	3.75 μm (H) x 3.75 μm (V)
Lens mount	C mount
Sync system	Internal/External (auto)
External sync signal input/output	HD/VD (HD/VD level: 2.5 to 5 Vp-p, 75 W)
External sync allowable frequency	±1 % (in horizontal synchronous frequency)
Jitter	Less than 20 ns
Scanning system	Non-interlace Progressive scan
Output signal frequency	Binning: 2-line combined / Normal: 1-line sequential output
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced
CCD vertical drive frequency	30fps: 29.7kHz (Normal mode) 26.79kHz (Binning mode) 15fps: 14.85kHz (Normal mode) 14.85kHz (Binning mode)
CCD horizontal drive frequency	30fps: 30Hz (Normal mode) 54.1Hz(Binning mode) 15fps: 15Hz (Normal mode) 30Hz (Binning mode)
Horizontal resolution	960 TV lines
Sensitivity	400 lx F5.6 (γ=OFF, FIX GAIN (0 dB))
Minimum illumination	1 lx (F1.4, g=OFF, GAIN +18 dB)
S/N ratio	56 dB (0 dB GAIN)
Gain	Manual (0 to +18dB)/FIX (0dB) (adjustable on rear panel or via RS-232C)
Gamma	OFF (fixed)
White clip	820 mV ±70 mV (F1.8, FIX GAIN (0 dB))
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000, 1/25000, 1/50000, 1/100000 s
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/50,000 s
External trigger	Polarity: +, Width: 2 μs to 250 ms, Input impedance: 10k Ω or more (H: +2.5 to 5.0 V, L: 0 to +0.6 V)
Partial scanning	Readout of center 480 lines at 56 fps, Readout of center 240 lines at 95.8 fps (settable using DIP switches) Readout of 60 effective lines selectable from 16 vertical divisions at max. 204.8 fps (settable via RS-232C)
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	approx. 2.8 W
Dimensions	29 (W) x 29 (H) x 63.5 (D) mm (not including protruding parts)
Mass	80g
Operating temperature	-5 to +45 °C
Storage temperature	-30 to +60 °C
Performance guarantee temperature	0 to +40 °C
Operating humidity	20 to 80%
Storage humidity	20 to 95%
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction - x,y,z)
Shock resistance	70G
MTBF	73,880 hrs. (approx. 8.4 years)
Regulatory compliance	UL60065, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326, VCCI : Class A
Supplied accessories	Lens mount cap (1), Operating instructions (1)

Rear Panel



Note

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 230 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① **VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal)connector (12-pin connector)**

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals (HD/VD signals).

② **M Gain (Manual Gain) control knob**

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

③ **Shutter speed/Mode setting DIP switch**

❶ **Shutter speed (bits 1-4)**

Set an appropriate shutter speed (factory setting: OFF).

w **Partial scan mode switch (5)**

The factory setting of this switch is partial scan OFF.

❷ **Restart reset/External trigger shutter mode switch (bits 6 to 8)**

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture imaging information on fast-moving objects at a precise moment in time. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

❸ **Gain switch (bit 9)**

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

❹ **Binning mode switch (bit 0)**

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

④ **Mode setting DIP switch**

❺ **75Ω termination switch**

Turn this to OFF (switch down position) when not terminating the external sync signal. The factory setting of this switch is ON (switch up position).

❻ **HD/VD signal input/output switch**

Set the switch to the down position (INT) to output HD/VD signals from the camera module, and set it to the up position (EXT) to input HD/VD signals from an external unit. The factory setting for this switch is the up position (EXT).

Note

Even when the switch is in the up position (EXT), the camera operates in internal synchronization mode unless an external HD signal is input. In this case, however, the camera module will not output internal sync signals.

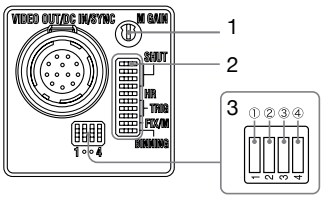
❽ **30 fps/15 fps switch**

30 fps: switch down position
15 fps: switch up position

❾ **RS-232C ON/OFF switch**

ON : switch up position
OFF: switch down position

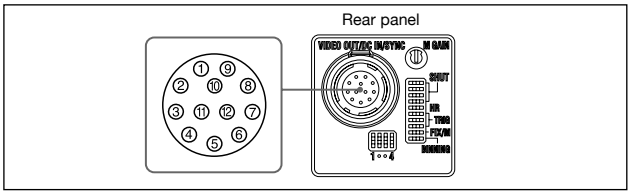
Factory Mode Settings of Rear Panel



No.	Switch	Factory setting mode
1	M GAIN control knob -*	
2	Shutter speed and mode setting DIP switches	All OFF (left)
3	Mode setting DIP switches	
	① 75 termination switchON (switch up position)	
	② HD/VD signal input/output switch`	HD/VD signal input (switch up position)
	③ 30 fps/15 fps switch	30 fps (switch down position)
	④ RS-232C ON/OFF switch	OFF (switch down position)

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output 1 (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output 1 (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	(RS232C (Rx)) *1	(RS232C (Rx)) *1	(RS232C (Rx)) *1	(RS232C (Rx)) *1
9	(RS232C (Tx)) *1	(RS232C (Tx)) *1	(RS232C (Tx)) *1	(RS232C (Tx)) *1
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground) *2

*1 When communicating with RS232C. *2 Commom ground for pins 7, 10, 11.

About the Camera Control Method

This camera can be controlled via a host device (such as a personal computer). The table below shows the functions that can be controlled. The camera can be controlled by sending commands that correspond to the control items, with parameters for the desired settings, if necessary, from the host device.

Control Function	Description	
Operating mode	Normal/ Restart reset/ Trigger mode 1/ Trigger mode 2	
Shutter speed	Normal	30 fps mode: OFF (1/30) to 1/1,000,000
		15 fps mode: OFF (1/15) to 1/5000
	Trigger	Internal setting: OFF (same as above) to 1/100,000
		Setting by trigger pulse width
	Gain	0 to +18 dB
	Binning function	OFF/ON
	Partial scan function	OFF/ON: Area settings can be made for 16 zones
	HD/VD signal input/output	External sync signal input/Internal sync signal output
	75 termination	ON/OFF
	Frame rate	30 fps/15 fps

Make sure to supply power to the camera module and confirm that the camera module is operating before inputting an external sync or trigger signal. Inputting an external signal before supplying the power may cause the camera module to malfunction.
Note: When using the external sync in combination with control from a host device (such as a personal computer), make sure the frequency is within the specified range. The camera cannot be controlled when the input is outside the specified frequency range.

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

●Normal shutter speed settings

30fps

The shutter will be off when the DIP swich is set as below.

1/125	1/250	1/500	1/1000	OFF	OFF
1/2000	1/4000	1/10000	1/20000	OFF	OFF
1/50000	1/100000	1/100		OFF	

15fps

The shutter will be off when the DIP swich is set as below.

1/125	1/250	1/500	1/1000	OFF	OFF
1/2000	1/4000	1/10000	1/25000	OFF	OFF
1/50000	1/100			OFF	OFF

(Unit: seconds)

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.
Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.
When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Note
High-rate scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

●Mode 1 (Non-reset mode)
In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.
- The video signal is synchronized with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronized with an internal VD signal when no external HD*/VD signal is input.

* External or internal synchronization is selected automatically depending on the presence or absence of external HD input.

●Mode 2 (Reset mode)
In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

●Using trigger pulse width
Set all DIP switches (1 to 4 on the rear panel) to OFF.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.
Exposure time = Trigger pulse width + 5 μsec

Mode 1 (Non-reset mode) / Mode 2 (Reset mode)

Note
An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

●Using the DIP switches on the rear panel
For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.
To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

R/R
6 7 8

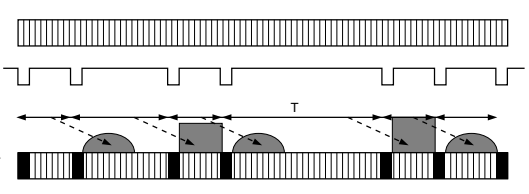
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



HIGH RESOLUTION B/W CAMERA MODULE

XC-HR70

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | C Lens Mount | XGA Output | Partial Scan
HD VD External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter

Connection Diagram P60

Outline

The XC-HR70 is an ultra-compact monochrome camera module ideal for high-resolution image capturing applications. A 1/3 type progressive scan CCD incorporated in the XC-HR70 allows the output of XGA resolution (1024 x 768) images at a rate of 30 frames/sec. In addition, the XC-HR70 has a “high rate scanning” function to enable the output of up to 120 frames/sec. for high-speed image capturing. The compact and light-weight body of the XC-HR70 makes it easy to install in space-restricted areas. With high-speed capturing capability offered in a compact body, the XC-HR70 is the ideal camera module for demanding applications such as the inspection of semiconductor production lines and high-speed assembly lines.

Features

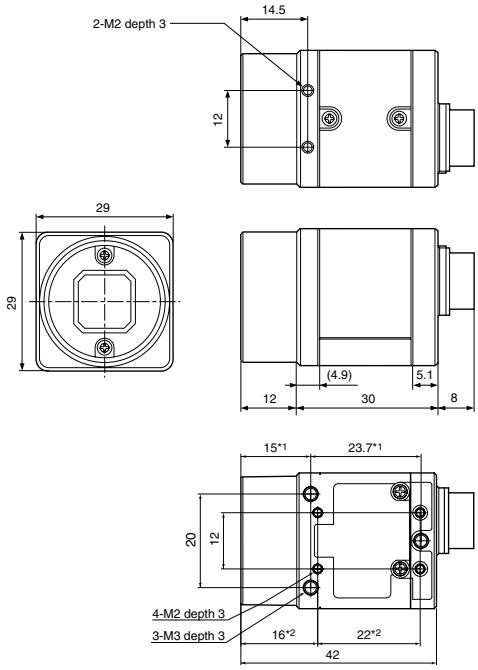
- High resolution image capturing
  - XGA resolution (1,024 x 768 pixels) image capturing at a speed of 30 frames/sec.
  - 1/3 type progressive scanning CCD with square pixels
    Effective picture element: 1,034 (H) x 779 (V)
- Partial scanning(at restart/reset ON, Binning OFF)
  Up to 120 frames/s (Effective line: 152 lines)
- Compact and lightweight
  29 (W) x 29 (H) x 30 (D) mm, 50 g
- External trigger shutter 1/4 to 1/100,000 sec.
- Electronic Shutter 1/100 to 1/20,000 sec.
- Synchronization Internal/External (HD/VD)
- C-mount system
- High shock and vibration tolerant

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-333I

Dimensions

Camera body of all XC-HR models

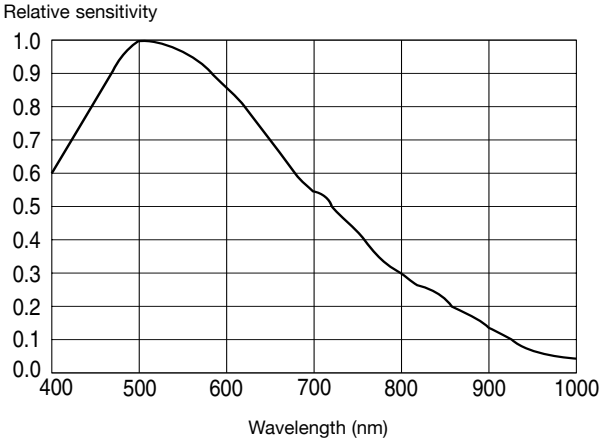


*1: for 3-M3 screw
*2: for 4-M2 screw

Unit: mm

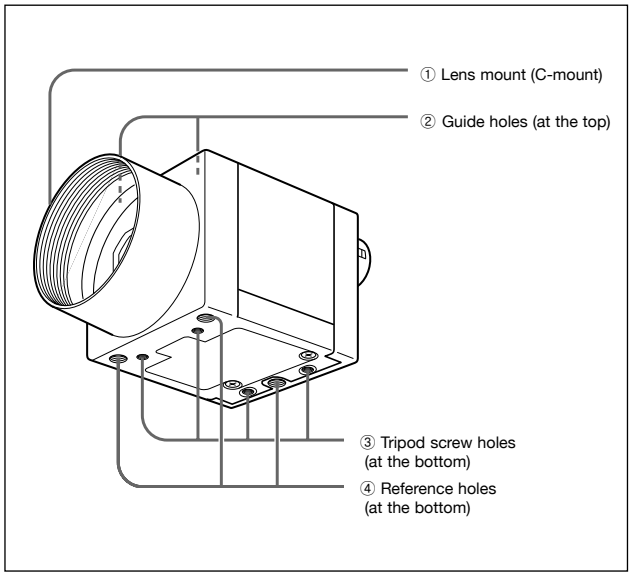
Spectral Sensitivity Characteristics

●XC-HR70
(Typical Values)



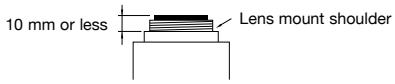
(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls



① Lens mount (C-mount)
Attach any C-mount lens, suitable for XGA-compatible resolution or other optical equipment.

Note
Be sure that the lens does not project more than 10 mm from the lens mount.



② Guide holes (at the top)
These screw holes help to lock the camera module.

③ Tripod screw holes (at the bottom)
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

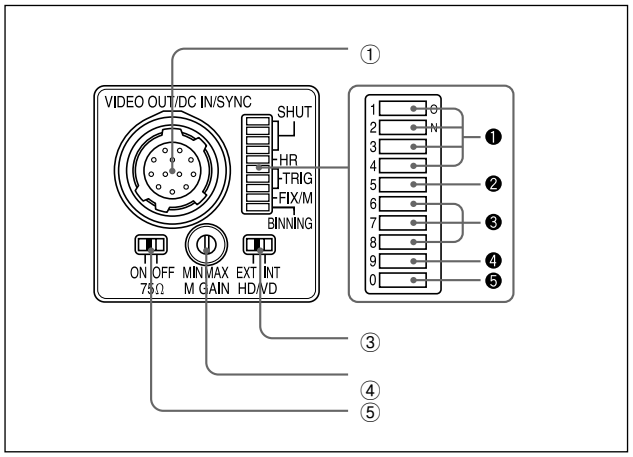
④ Reference holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-HR70
Image device	1/3 type progressive scan IT CCD
Effective picture elements	1,034 (H) x 779 (V)
Effective lines	1,024 (H) x 768 (V)
Image size	XGA size : 1,024 (H) x 768 (V)
Unit cell size	4.65 μm (H) x 4.65 μm (V)
Lens mount	C mount
Sync system	Internal/External (auto)
External sync signal input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75 Ω)
External sync allowable frequency	±1 % (in horizontal synchronous frequency)
Jitter	Less than 20 ns
Scanning system	Non-interlace Progressive scan
Output signal frequency	Binning: 2-line combined output 29.2 fps/ Normal: 1-line sequential output 58.4 fps
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced
CCD vertical drive frequency	23.23 kHz ±1 %
CCD horizontal drive frequency	29.2 Hz (normal mode), 58.4 Hz (binning mode)
Horizontal resolution	800 TV lines
Sensitivity	400 lx F5.6 (γ=OFF, FIX GAIN (0 dB))
Minimum illumination	1 lx (F1.8, γ=OFF, GAIN +18 dB)
S/N ratio	56 dB (0 dB GAIN)
Gain	Manual (0 to 18 dB)/Fix (0 dB) (adjustable on the rear panel)
Gamma	OFF (fixed)
White clip	820 mV ±70 mV (F1.8, FIX GAIN (0 dB))
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/20,000 s
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 μs to 250 ms, Input impedance: 10k Ω or more (H: +2 to 5.0 V, L: 0 to +0.6 V)
Partial scanning	R/R mode binning off: max 120 frames/s (effective line: 152 lines)
	binning on: max 180 frames/s (effective line: 89 lines)
	External trigger shutter mode (MODE 1) binning off: max 120 frames/s (effective line: 153 lines)
	binning on: max 180 frames/s (effective line: 90 lines)
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	2.0 W
Dimensions	29 (W) x 29 (H) x 30 (D) mm (not including protruding parts)
Mass	50 g
Operating temperature	-5 to +45 °C
Storage temperature	-30 to +60 °C
Performance guarantee temperature	0 to +40 °C
Operating humidity	20 to 80 %
Storage humidity	20 to 95 %
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction - x,y,z)
Shock resistance	70 G
MTBF	88,044 hrs. (approx. 10.1 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1)

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



Note

Be sure to turn the power off before making switch settings.
As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① **VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal)connector (12-pin connector)**

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals (HD/VD signals).

Shutter speed/Mode setting DIP switch

❶ Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

❷ Partial scan mode switch (bit 5)

The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make the external VD pulse rate and width settings.

❸ Restart reset/External trigger shutter mode switch (bits 6 to 8)

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture imaging information on fast-moving objects at a precise moment in time. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

❹ Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

❺ Binning mode switch (bit 0)

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

③ **HD/VD signal input/output switch**

Set the switch to INT to output HD/VD signals from the camera module.
Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

Note

Even when the switch is set to EXT, the camera module operates in internal synchronization mode when no external HD signal is input. In this case, however, the camera module will not output internal sync signals.

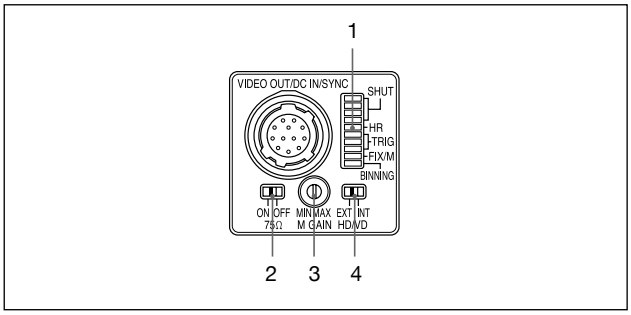
④ **M Gain (Manual Gain) control knob**

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

⑤ **75Ω termination switch**

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

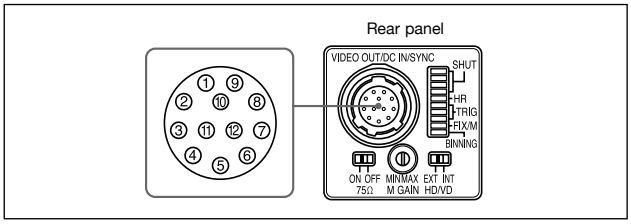
Factory Mode Settings of Rear Panel



Number	Switch name	Factory mode setting
1	Shutter speed and mode setting DIP switches	All bits are OFF (left).
2	75Ω termination switch	ON
3	M GAIN control knob	- *
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output 1 (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output 1 (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	Reset (Ground)*

* Common ground for pins 7, 10, and 11

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

* The electronic shutter cannot be used in restart/reset mode. Partial scan can be used in restart/reset mode and in external trigger shutter mode 1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

●Normal shutter speed settings

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/20000
1/100			

(Unit: seconds)

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.
Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.
When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scannig	
OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

Note

High-rate scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

- The video signal is synchronized with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronized with an internal VD signal when no external HD*/VD signal is input.

* External or internal synchronization is selected automatically depending on the presence or absence of external HD input.

●Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

●Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to OFF.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.
Exposure time = Trigger pulse width + 5 μsec

Mode 1 (Non-reset mode)	Mode 2 (Reset mode)
1 2 3 4	1 2 3 4

Note

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

●Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.
To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

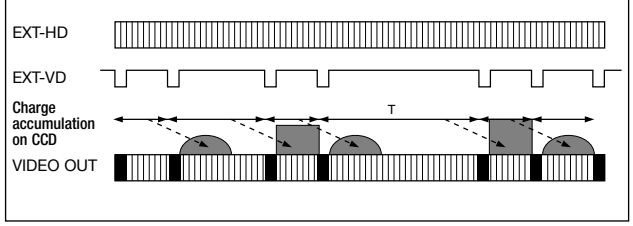
R/R
6 7 8

Partial scan	
OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



HIGH FRAME RATE CAMERA

XC-HR50
XC-HR57

12TV Output | Progressive Scan | 1/3 Type CCD *1 | 1/2 Type CCD *2 | Square Pixels | C Lens Mount | VS Output | VGA Output | 1/60 Sec 1N: Non-interlace | Partial Scan | HD VD External Sync | Restart Reset | Long Exposure | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter

*1 :XC-HR50
*2 :XC-HR57

Double Scan | PS

Connection Diagram P60

Outline

The XC-HR50 and XCHR57 are monochrome camera modules with full pixel read-out. The XC-HR50 incorporates a 1/3 type double scan CCD, and the XC-HR57 incorporates a 1/2 type double scan CCD. Both cameras have VGA resolution (648 (H) x 494 (V)) output at 60 frames/sec, making them ideal for high-speed image capturing. Relying on high-density mounting technology, these cameras are the same size as other Sony cameras in the XC-HR series and XC-E series, which increases their mechanical compatibility. These ultra-compact (29 (W) x 29 (H) x 30 (D) mm) double-speed progressive scan cameras are also lightweight and have a short tact time.

Features

■ XC-HR50:1/3 Type PS CCD
XC-HR57:1/2 Type PS CCD
- Double Scan CCD
- The CCD has square pixels eliminating the need for aspect ratio conversion.
- VGA resolution (648 x 494 pixels) image capturing at a speed of 60 frames/sec.

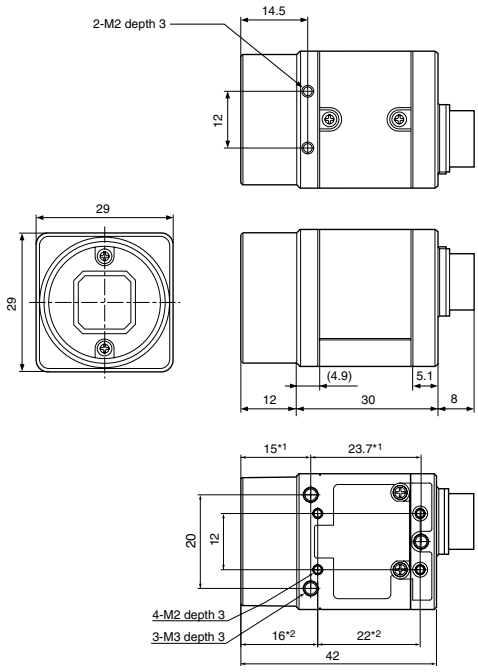
■ Partial scanning (at restart/reset ON, Binning OFF)
Up to 240 frames/sec. (Effective line: 100 lines)
■ Compact and lightweight
29 (W) x 29 (H) x 30 (D) mm, 50 g
■ External trigger shutter 1/4 to 1/100,000 sec.
■ Electronic Shutter 1/100 to 1/20,000 sec.
■ Synchronization Internal/External (HD/VD)
■ C-mount system
■ High shock and vibration tolerant

Accessories

■ Compact camera adaptor
●DC-700/700CE
■ 12-pin camera cable (CE standard)
●CCXC-12P02N (2 m)
●CCXC-12P05N (5 m)
●CCXC-12P10N (10 m)
●CCXC-12P25N (25 m)
■ Tripod adaptor
●VCT-333I

Dimensions

Camera body of all XC-HR models



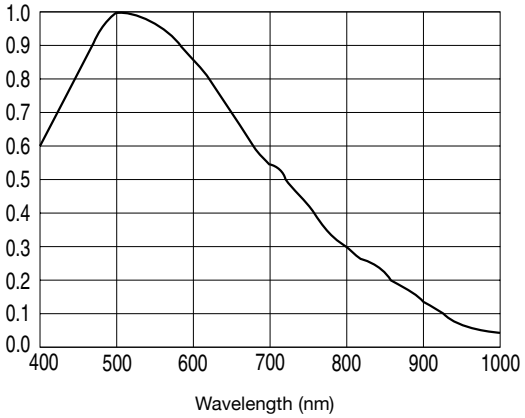
*1: for 3-M3 screw
*2: for 4-M2 screw

Unit: mm

Spectral Sensitivity Characteristics

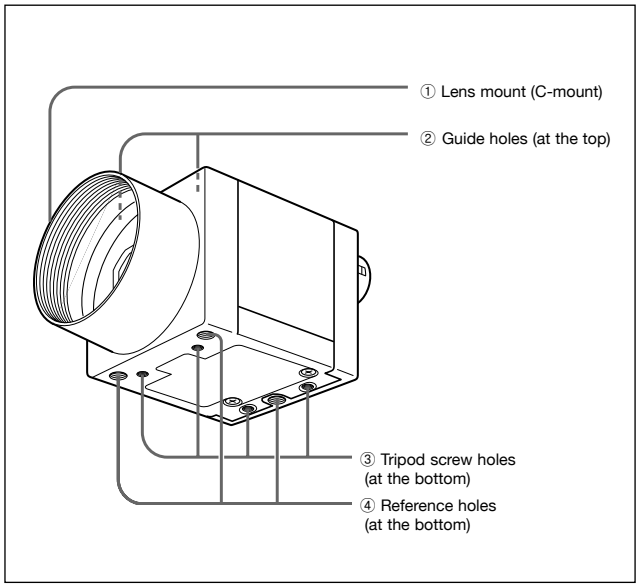
●XC-HR50/HR57
(Typical Values)

Relative sensitivity



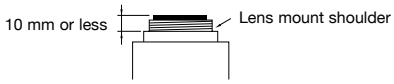
(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls



① Lens mount (C-mount)
Attach any C-mount lens or other optical equipment.

Note
Be sure that the lens does not project more than 10 mm from the lens mount.



② Guide holes (at the top)
These screw holes help to lock the camera module.

③ Tripod screw holes (at the bottom)
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

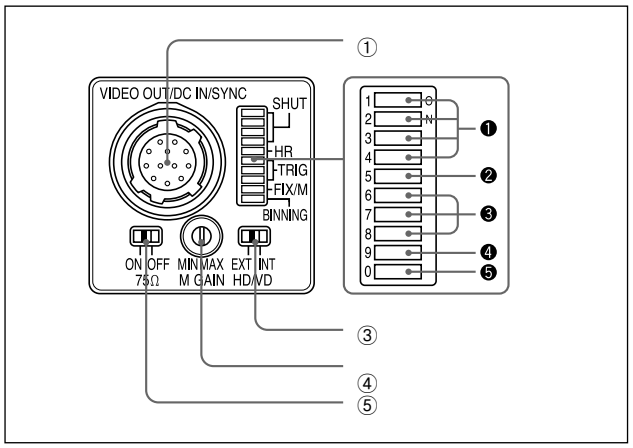
④ Reference holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-HR50	XC-HR57
Image device	1/3 type progressive scan IT CCD	1/2 type progressive scan IT CCD
Effective picture elements	659 (H) x 494 (V)	
Effective lines	648 (H) x 494 (V)	
Image size	VGA size : 648 (H) x 494 (V)	
Cell size	7.4 μm (H) X 7.4 μm (V)	9.9 μm (H) X 9.9 μm (V)
Lens mount	C mount	
Sync system	Internal/External (auto)	
External sync signal input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)	
External sync allowable frequency	±1 % (in horizontal sync frequency)	
Jitter	Less than 20 ns	
Scanning system	Non-interlace Progressive scan	
Output signal frequency	Binning: 2-line combined output 120 fps/ Normal: 1-line sequential output 60 fps	
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced	
CCD vertical drive frequency	31.468 kHz	
CCD horizontal drive frequency	59.94 MHz (normal mode), 119.88 Hz (binning mode)	
Horizontal resolution	500 TV lines	
Sensitivity	400 lx F5.6 (γ=OFF, FIX GAIN (0 dB))	
Minimum illumination	1 lx (F1.4, γ=OFF, GAIN +18 dB)	
S/N ratio	58 dB (0 dB GAIN)	
Gain	Manual (0 to 18 dB)/Fix (0 dB) (adjustable on the rear panel)	
Gamma	OFF (fixed)	
White clip	820 mV ±70 mV (F1.4, FIX GAIN (0 dB))	
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)	
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/15,000, 1/30,000 s	
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s	
External trigger	Polarity: +, Width: 2 μs to 250 ms, Input impedance: 10kΩ or more	
Partial scanning	R/R mode binning off: max 240 frames/s (effective line: 102 lines)	
	binning on: max 362 frames/s (effective line: 59 lines)	
	External trigger shutter mode (MODE 1) binning off: max 240 frames/s (effective line: 100 lines)	
	binning on: max 362 frames/s (effective line: 57 lines)	
Power requirements	DC 12 V (+10.5 V to +15.0 V)	
Power consumption	1.8 W	
Dimensions	29 (W) x 29 (H) x 30 (D) mm	
Mass	50 g	
Operating temperature	-5 to +45 °C	
Storage temperature	-30 to +60 °C	
Performance guarantee temperature	0 to +40 °C	
Operating humidity	20 to 80 % (no condensation)	
Storage humidity	20 to 95 % (no condensation)	
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction - x,y,z)	
Shock resistance	70 G	
MTBF	88,044 hrs. (approx. 10.1years)	
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326	
Supplied accessories	Lens mount cap (1), Operating instructions (1)	

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



Note

Be sure to turn the power off before making switch settings.
As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① **VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)**
Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals (HD/VD signals).

②**Shutter speed/Mode setting DIP switch**

❶ Shutter speed (bits 1-4)
Set an appropriate shutter speed (factory setting: OFF).

❷ Partial scan mode switch (bit 5)
The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make the external VD pulse rate and width settings.

❸ Restart reset/External trigger shutter mode switch (bits 6 to 8)
By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture fast-moving objects at precise locations. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

❹ Gain switch (bit 9)
This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

❺ Binning mode switch (bit 0)
Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

③ **HD/VD signal input/output switch**
Set the switch to INT to output HD/VD signals from the camera module.
Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

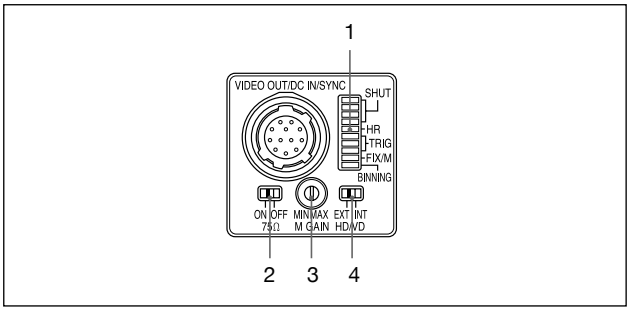
Note

Even when the switch is set to EXT, the camera module operates in internal synchronization mode when no external HD signal is input. In this case, however, the camera module will not output internal sync signals.

④ **M Gain (Manual Gain) control knob**
If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

⑤ **75Ω termination switch**
Turn this to OFF when not terminating the external sync signal (factory setting: ON).

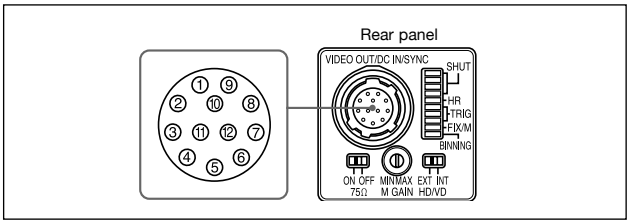
Factory Mode Settings of Rear Panel



Number	Switch name	Factory mode setting
1	Shutter speed and mode setting DIP switches	All bits are OFF (left).
2	75Ω termination switch	ON
3	M GAIN control knob	- *
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX", so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output 1 (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output 1 (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	Reset (Ground)*

* Common ground for pins 7, 10, and 11

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

* The electronic shutter cannot be used in restart/reset mode. Partial scan can be used in restart/reset mode and in external trigger shutter mode 1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

●Normal shutter speed settings

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/15000
1/30000	1/100		

(Unit: seconds)

External Trigger Shutter

Mode 1	Mode 2
6 7 8	6 7 8

Partial scannig

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

Inputting an external trigger pulse enables the camera to capture first-moving objects clearly.
Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.
When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Note

Partial scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

- The video signal is synchronized with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronized with an internal VD signal when no external HD*/VD signal is input.

* External or internal synchronization is selected automatically depending on the presence or absence of external HD input.

●Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

●Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to OFF.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.
Exposure time = Trigger pulse width + 6 μsec

Mode 1 (Non-reset mode)

Mode 2 (Reset mode)

Note

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

●Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.
To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

R/R
6 7 8

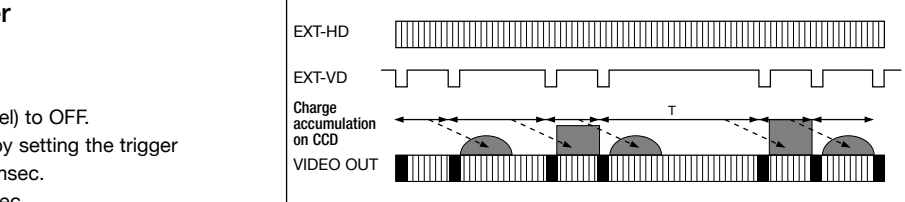
High-rate scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



HIGH FRAME RATE CAMERA

XC-HR58

Non-TV Output | Progressive Scan | 1/2 Type CCD | Square Pixels | C Lens Mount | VS Output | SVGA Output
1/50 Sec. 1N: Non-interface | Partial Scan | HD VD External Sync | Restart Reset | Long Exposure | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter

Double Scan PS

Connection Diagram P60

Outline

The XC-HR58 is a monochrome camera module that incorporates 1/2 type double scan CCD with full pixel readout. With SVGA resolution (767 x 580) output at 50 frames/sec, this camera is ideal for high-speed image capturing. Relying on high-density mounting technology, this camera is the same size as other Sony cameras in the XC-HR series and XC-E series, which increases its mechanical compatibility. This ultra-compact (29 (W) x 29 (H) x 30 (D) mm) double-speed progressive scan camera is also lightweight and has a short tact time.

Features

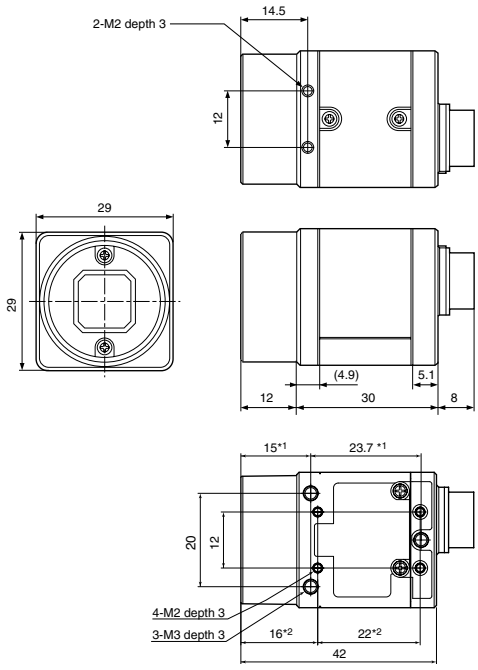
- 1/2 Type PS CCD
  - Double Scan CCD has square pixels
  - The CCD has squre pixels eliminating the need for aspect ratio conversion.
  - SVGA resolution (767 x 580 pixels) image capturing at a speed of 50 frames/sec
- Partial scanning (at restart/reset ON, Binning OFF)
  Up to 200 frames/sec. (Effective line: 111 lines)
- Compact and lightweight
  29 (W) x 29 (H) x 30 (D) mm, 50 g
- External trigger shutter 1/4 to 1/100,000 sec.
- Electronic Shutter 1/100 to 1/20,000 sec.
- Synchronization Internal/External (HD/VD)
- C-mount system
- High shock and vibration tolerant

Accessories

- Compact camera adaptor
  - DC-700/700CE
- 12-pin camera cable (CE standard)
  - CCXC-12P02N (2 m)
  - CCXC-12P05N (5 m)
  - CCXC-12P10N (10 m)
  - CCXC-12P25N (25 m)
- Tripod adaptor
  - VCT-333I

Dimensions

Camera body of all XC-HR models



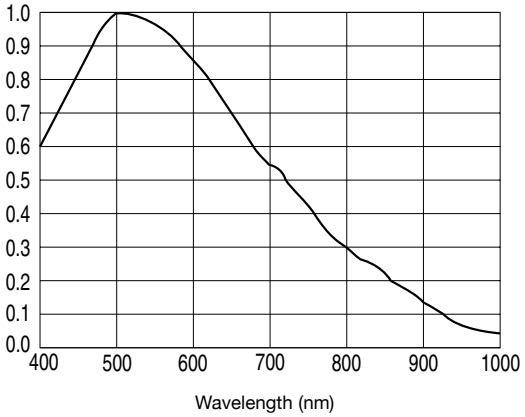
*1: for 3-M3 screw
*2: for 4-M2 screw

Unit: mm

Spectral Sensitivity Characteristics

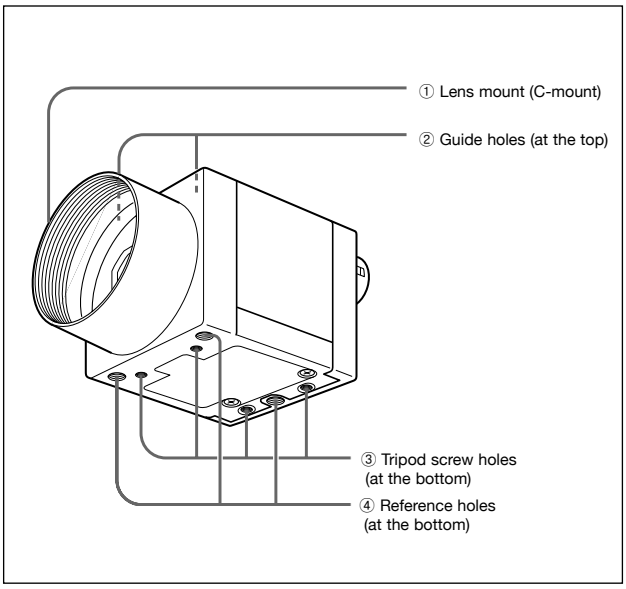
●XC-HR58
(Typical Values)

Relative sensitivity



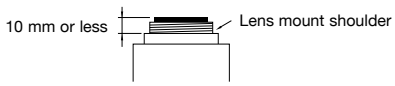
(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls



① Lens mount (C-mount)
Attach any C-mount lens or other optical equipment.

Note
Be sure that the lens does not project more than 10 mm from the lens mount.



② Guide holes (at the top)
These screw holes help to lock the camera module.

③ Tripod screw holes (at the bottom)
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

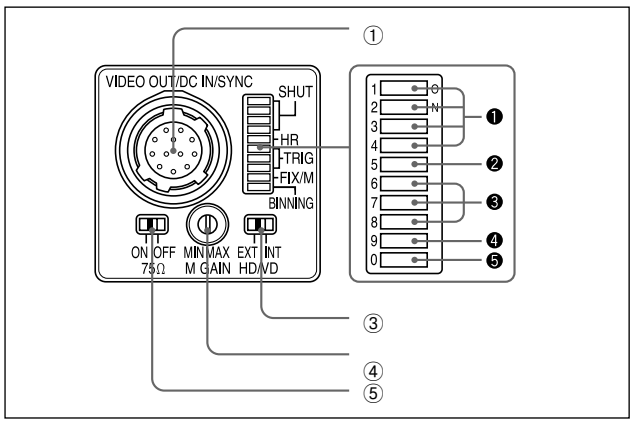
④ Reference holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-HR58
Image device	1/2 type progressive scan IT CCD
Effective picture elements	782 (H) x 582 (V)
Effective lines	767 (H) x 580 (V)
Image size	SVGA size : 767 (H) x 580 (V)
Cell size	8.3 μm (H) x 8.3 μm (V)
Lens mount	C mount
Sync system	Internal/External (auto)
External sync signal input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)
External sync allowable frequency	±1 % (in horizontal sync frequency)
Jitter	Less than 20 ns
Scanning system	Non-interlace Progressive scan
Output signal frequency	Binning: 2-line combined output 100 fps/ Normal: 1-line sequential output 50 fps
Video output	1.0 Vp-p, sync negative, 75 Ω, unbalanced
CCD vertical drive frequency	31.250 kHz ±1 %
CCD horizontal drive frequency	50 Hz (normal mode), 100 Hz (binning mode)
Horizontal resolution	600 TV lines
Sensitivity	400 lx F5.6 (γ=OFF, FIX GAIN (0 dB))
Minimum illumination	1 lx (F1.4, γ=OFF, GAIN +18 dB)
S/N ratio	56 dB (0 dB GAIN)
Gain	Manual (0 to 18 dB)/Fix (0 dB) (adjustable on the rear panel)
Gamma	OFF (fixed)
White clip	820 mV ±70 mV (F1.4, FIX GAIN (0 dB))
Shutter	Normal shutter, Restart/Reset, External trigger shutter (Mode 1/Mode 2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/15,000, 1/30,000 s
External trigger shutter speed	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 μs to 250 ms, Input impedance: 10kΩ or more (H: +2 to 5.0V, L: 0 to +0.6V)
Partial scanning	R/R mode binning off: max 200 frames/s (effective line: 111 lines)
	binning on: max 300 frames/s (effective line: 59 lines)
	External trigger shutter mode (MODE 1) binning off: max 200 frames/s (effective line: 109 lines)
	binning on: max 300 frames/s (effective line: 57 lines)
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	2.0 W
Dimensions	29 (W) x 29 (H) x 30 (D) mm
Mass	50 g
Operating temperature	-5 to +45 °C
Storage temperature	-30 to +60 °C
Performance guarantee temperature	0 to +40 °C
Operating humidity	20 to 80 % (no condensation)
Storage humidity	20 to 95 % (no condensation)
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction - x,y,z)
Shock resistance	70 G
MTBF	88,044 hrs. (approx. 10.1 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326:, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1)

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



Note

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① **VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)**

Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals (HD/VD signals).

Shutter speed/Mode setting DIP switch

❶ Shutter speed (bits 1-4)

Set an appropriate shutter speed (factory setting: OFF).

w **Partial scan mode switch (bit 5)**

The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make the external VD pulse rate and width settings.

❷ Restart reset/External trigger shutter mode switch (bits 6 to 8)

By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture imaging information on fast-moving objects at a precise moment in time. The factory settings for these switches are for normal operation (restart/reset and external trigger shutter OFF).

❸ Gain switch (bit 9)

This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

❹ Binning mode switch (bit 0)

Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

③ **HD/VD signal input/output switch**

Set the switch to INT to output HD/VD signals from the camera module.

Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

Note

Even when the switch is set to EXT, the camera module operates in internal synchronization mode when no external HD signal is input. In this case, however, the camera module will not output internal sync signals.

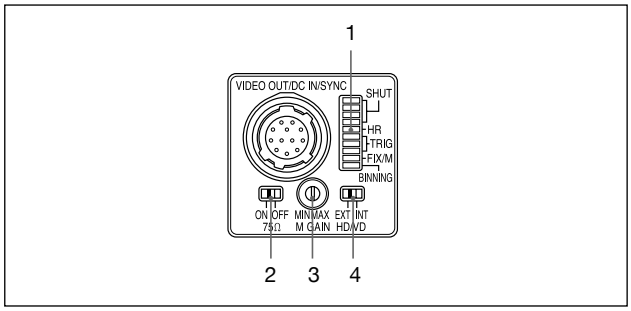
④ **M Gain (Manual Gain) control knob**

If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain.

⑤ **75Ω termination switch**

Turn this to OFF when not terminating the external sync signal (factory setting: ON).

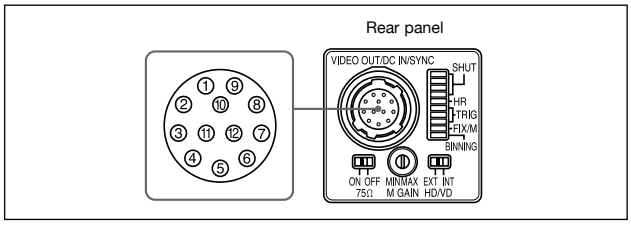
Factory Mode Settings of Rear Panel



Number	Switch name	Factory mode setting
1	Shutter speed and mode setting DIP switches	All bits are OFF (left).
2	75Ω termination switch	ON
3	M GAIN control knob	- *
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	—
10	—	—	—	WEN output (Signal)
11	—	—	—	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)*

* Common ground for pins 7, 10, and 11

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

* The electronic shutter cannot be used in restart/reset mode. Partial scan can be used in restart/reset mode and in external trigger shutter mode 1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

●Normal shutter speed settings

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/15000
1/30000	1/100		

(Unit: seconds)

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.
Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.
When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scannig

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

Note

Partial scan mode cannot be used while in external trigger shutter mode 2.

There are two modes for the timing in which video signals are obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

- The video signal is synchronized with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronized with an internal VD signal when no external HD*/VD signal is input.

* External or internal synchronization is selected automatically depending on the presence or absence of external HD input.

●Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

●Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to OFF.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.
Exposure time = Trigger pulse width + 5 μsec

Mode 1 (Non-reset mode)

Mode 2 (Reset mode)

Note

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

●Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.
To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

R/R
6 7 8

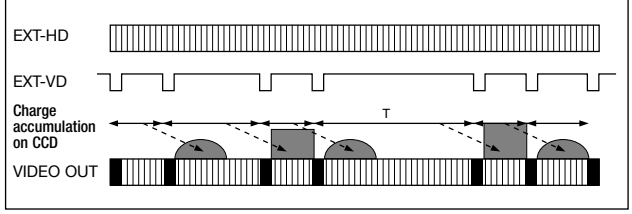
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



PROGRESSIVE SCAN CAMERA MODULE

XC-56

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | C Lens Mount | VS Output | * VGA Output
1/30 Sec 1N: Non-interlace | Partial Scan | HD VD External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter
Mode 2 (Non-Reset Mode) External Trigger Shutter

* Requires specific acquisition board.

Connection Diagram P61

Outline

The XC-56 is a monochrome camera module that incorporates a 1/3 type progressive scan CCD.
The XC-56 has VGA-class resolution (647 (H) x 493 (V)) output at 30 frames/sec. and 60 frames/sec. by the binning function. The body dimensions are 29(W) x 29 (H) x 30(D), which are same as those of XC-HR series. The pin assignment is compatible to the current XC-55.

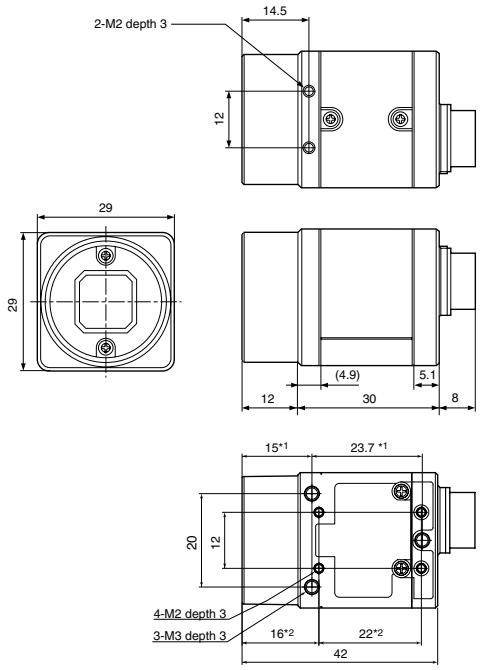
Features

- Incorporating a 1/3 type progressive scan CCD
- Non-TV format
- Square pixel/ Full pixel read-out
- VGA-class resolution image output, 30 frames/sec.
- Partial scanning function
- External trigger shutter
  - Restart/Reset
  - Mode 1 (Non-reset mode)
  - Mode 2 (Reset mode)
- Various settings are available on the rear panel

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-333I

Dimensions



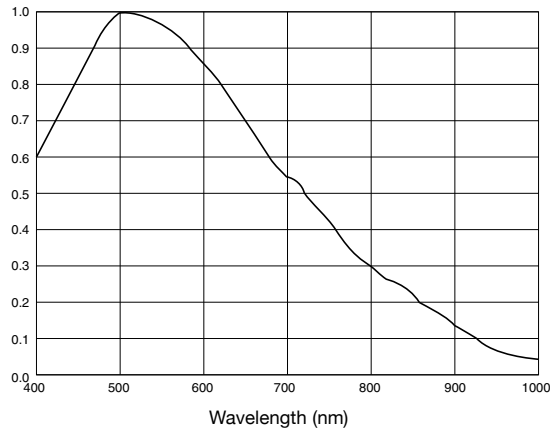
*1: for 3-M3 screw
*2: for 4-M2 screw

Unit: mm

Spectral Sensitivity Characteristics

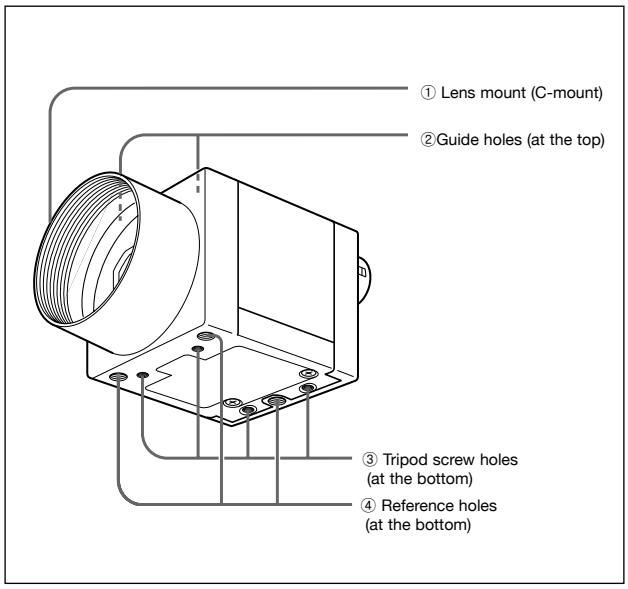
●XC-HR56

Relative sensitivity



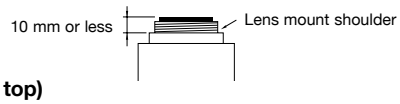
(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls



① Lens mount (C-mount)
Attach any C-mount lens or other optical equipment.

Note
Be sure that the lens does not project more than 10 mm from the lens mount.



② Guide holes (at the top)
These screw holes help to lock the camera module.

③ Tripod screw holes (at the bottom)
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

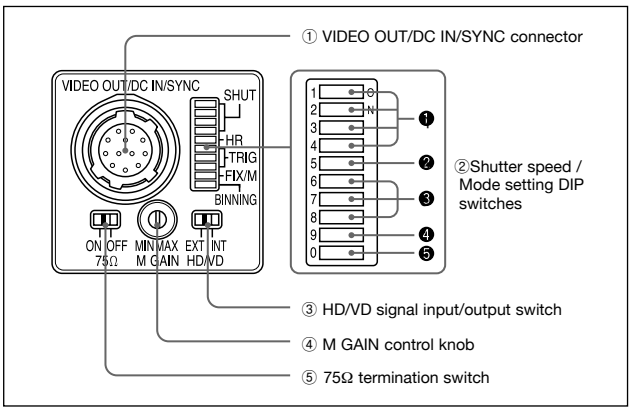
④ Reference holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Specifications

	XC-56
Image device	1/3 type Progressive Scan IT CCD
Effective picture elements (HxV)	659 (H) x 494 (V)
Effective lines (HxV)	647 (H) x 493 (V)
Output image size	VGA class (647 (H) x 494 (V))
Cell size	7.4 μm (H) x 7.4 μm (V)
Lens mount	C-mout
Sync system	Internal / External (automatically switched according to input signal)
External synchronization input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)*
Allowable frequency deviation of external synchronization	±1 % (in horizontal synchronous frewuency)
H jitter	Less than 20 ns
Scan lines	525-line/236-line (Normal mode/ Binning mode)
Video output mode	Normal: 1 -line sequentia output 29.97 fps / Binning: F2 -line sequential output 59.94 fps
Video output	1.0Vp-p, sync negative, 75Ω unbalanced
Horizontal frequency	15.734 KHz
Output signal frequency	29.97 Hz (Normal mode) 59.94 Hz (Bininning mode)
Horizontal resolution	500TV lines
Sensitivity	400 lx F8 (γ= OFF, FIX GAIN (0 dB))
Minimum illumination	0.5 lx (F1.4, γ= OFF, GAIN +18 dB)
Video S/N ratio	58 dB (GAIN 0 dB)
Gain	Fixed/Manunally adjustable
Gamma	OFF (γ =1) (fixed)
White clip	820 mV ± 70mV
Shutter mode	Normal shutter, Restart/Reset, External trigger shutter (Mode1/Mode2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/8,000, 1/15,000 s
External trigger shutter	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s
	Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 μs to 250 ms, Input impedance: 10kΩ or more (H: +2 to 5.0V, L: 0 to +0.6V)
Pin Assignment	Correspondence to EIAJ compliant 12PIN connector pin assignment Unavailable (No.8 pin: Trigger input (G), No.9 pin: Trigger input,
	No.10 pin: GRD, No.11pin: +12V) Pins No.10 and 11 are not connected inside the camera
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	1.5 W
Dimensions	29 (W) x 29 (H) x 30 (D) mm
Mass	50 g
Operating temperature	-5 to +45 °C
Storage temperature	-30 to +60 °C
Performance guarantee temperature	0 to +40 °C
Operating humidity	20 to 80 % (no condensation)
Storage humidity	20 to 95 % (no condensation)
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction - x,y,z)
Shock resistance	70 G
MTBF	88,044 hrs. (approx. 10.1 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassA, CE : EN61326, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1), Lens

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



Note

Be sure to turn the power off before making switch settings.
As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① **VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)**
Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12 V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals (HD/VD signals).

Shutter speed/Mode setting DIP switch

❶ Shutter speed (bits 1-4)
Set an appropriate shutter speed (factory setting: OFF).

❷ Partial scan mode switch (bit 5)
The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use Partial scan mode, you also need to make pulse rate settings.

❸ Restart reset/External trigger shutter mode switch (bits 6 to 8)
By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture fast-moving objects at precise locations. The factory settings for these switches are for normal operation.

❹ Gain switch (bit 9)
This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

❺ Binning mode switch (bit 0)
Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

③ **HD/VD signal input/output switch**
Set the switch to INT to output HD/VD signals from the camera module.Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

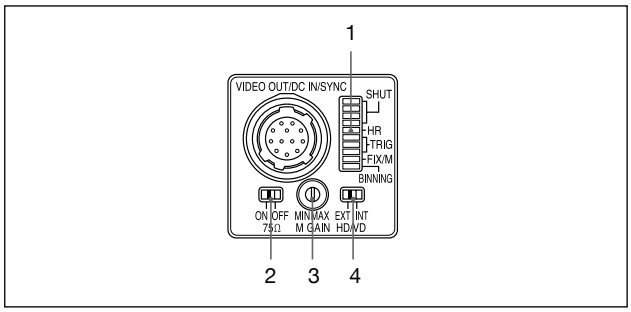
Note

Even when the switch is set to EXT, the camera module operates in internal synchronization mode unless an external HD signal is input. In this case, however, the camera module will not output internal sync signals.

④ **M GAIN (Manual Gain) control knob**
If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain. The dimensions of the groove on the knob are 0.5 (W) X 1.9 (L) X 0.45 (D)mm.
Use a screwdriver that is appropriate for these dimensions.
The knob can be rotated 260 degrees. Do not rotate the knob over the stopper on the limit point.

⑤ **75Ω termination switch**
Turn this to OFF when not terminating the external sync signal (factory setting: ON).

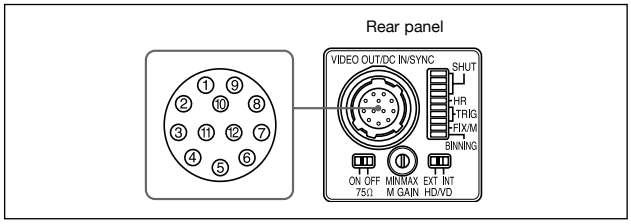
Factory Mode Settings of Rear Panel



Number	Switch name	Factory mode setting
1	Shutter speed and mode setting DIP switches	All bits are OFF (left).
2	75Ω termination switch	ON
3	M GAIN control knob	-*
4	HD/VD signal input/output switch	EXT

* This unit is shipped from the factory with the gain switch (DIP switch 9) being set to "FIX," so the M GAIN control knob is not operative unless the switch setting is changed. When the gain switch (DIP switch 9) is set to MANUAL, you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	Trigger pulse input (Signal)
10	—	—	—	—
11	—	—	—	—
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)*

* Common ground for pins 7, 10, and 11

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.
*1 The electronic shutter cannot be used in restart/reset mode.
*2 Partial scan can be used in restart/reset mode and in external trigger shutter mode 1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

●Normal shutter speed settings

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/8000	1/15000
1/100			

(Unit: seconds)

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture first-moving objects clearly. Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2. When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scannig

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

Note

Partial scan mode cannot be used while in external trigger shutter mode 2.
There are two modes for the timing in which video signals are obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

- The video signal is synchronized with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronized with an internal VD signal when no external HD*/VD signal is input.

* External or internal synchronization is selected automatically depending on the presence or absence of external HD input.

●Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

●Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to OFF.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.
Exposure time = Trigger pulse width + 8 μsec

Mode 1 (Non-reset mode)

Mode 2 (Reset mode)

Note

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

●Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000	1/25000
1/50000	1/100000	1/100	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.
To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

R/R
6 7 8

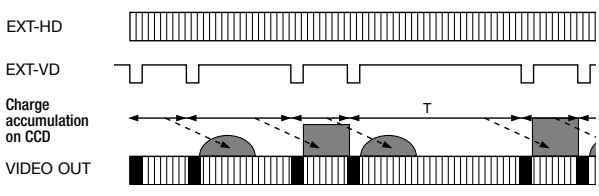
Partial scan

OFF	ON
5	5

Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart



PROGRESSIVE SCAN MODULE

XC-56BB

Non-TV Output | Progressive Scan | 1/3 Type CCD | Square Pixels | NF Lens Mount | VS Output | VGA Output*
1/30 Sec 1N: Non-interlace | Partial Scan | HD VD External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter
Mode 2 (Non-Reset Mode) External Trigger Shutter | Remote Head

Ps

* Requires specific acquisition board.

Connection Diagram P61

Outline

The XC-56BB is a small-sized head-detachable monochrome camera module that incorporates a 1/3 type progressive scan CCD. The XC-56BB has the same camera function as those of XC56. The XC-56BB has VGA-class resolution output at 30 frames/sec. The XC-56BB is a compact model succeeding to the XC-55BB with the dimensions of 22 (W) x 22 (H) x 30 (D) for the camera head and 29(W) x 29 (W) x 67(D) for the control part.

Features

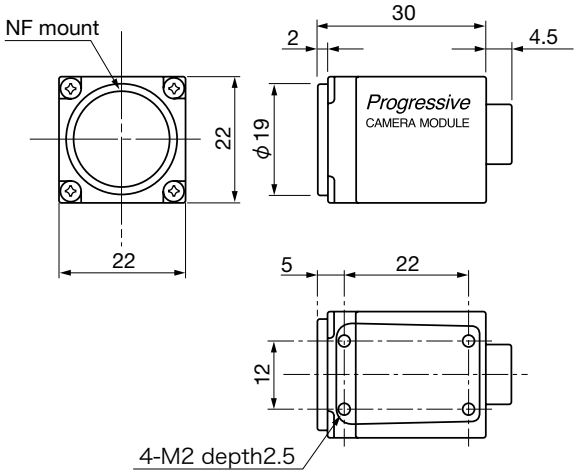
- Incorporating a 1/3 type progressive scan CCD
- Non-TV format
- Square pixel/ Full pixel read-out
- VGA-class resolution image output, 30 frames/sec.
- Partial scanning function
- External trigger shutter
  - Restart/Reset
  - Mode 1 (Non-reset mode)
  - Mode 2 (Reset mode)
- Various settings are available on the rear panel
- Cable Length: 2 m

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P25N (25 m)
- C-mount adaptor
  - ●LO-999CMT
- NF-mount LENS
  - ●VCL-03S12XM
  - ●VCL-06S12XM
  - ●VCL-12S12XM
- Tripod adaptor
  - ●VCT-333I (for CHU)
  - ●VCT-55I (for CCU)

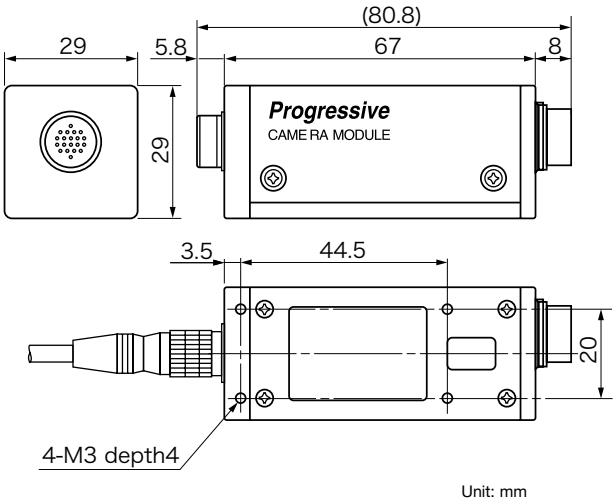
Dimensions

●CHU



Unit: mm

●CCU

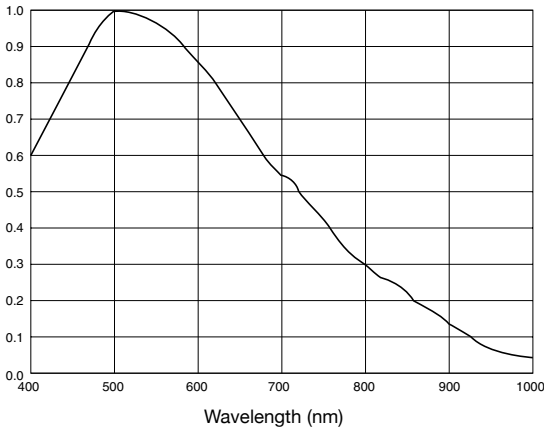


Unit: mm

Spectral Sensitivity Characteristics

●XC-56BB

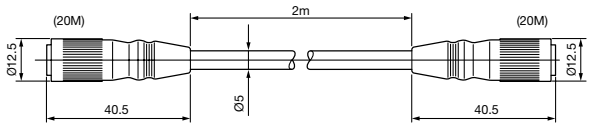
Relative sensitivity



(Lens characteristics and light source characteristics excluded.)

Supplied Accessories

Dedicated cable CCU and CHU



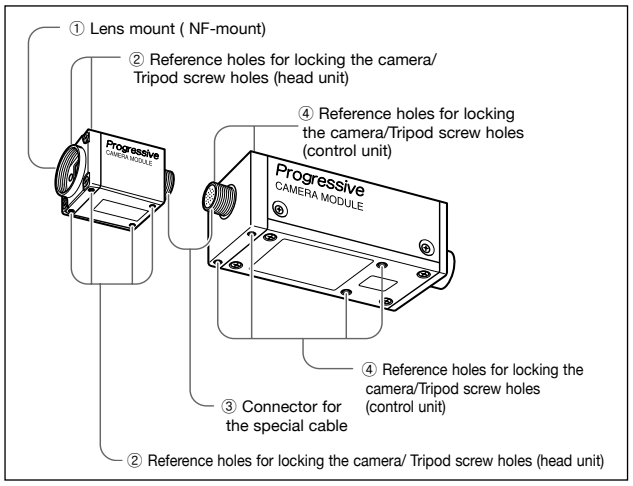
CHU (20pin-M)/CCU (20pin-M)

Specifications

	XC-56BB
Image device	1/3 type Progressive Scan IT CCD
Effective picture elements (HxV)	659 (H) x 494 (V)
Effective lines (HxV)	647 (H) x 493 (V)
Output image size	VGA class (647 (H) x 494 (V))
Cell size	7.4 μm (H) x 7.4 μm (V)
Lens mount	NF-mout
Flange focal length	12.0 mm
Sync system	Internal / External (automatically switched according to input signal)
External synchronization input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p, 75Ω)
Allowable frequency deviation of external synchronization	±1 % (in horizontal synchronous frewuency)
H jitter	Less than 20 ns
Scan lines	525-line/236-line (Normal mode/ Binning mode)
Video output mode	Normal: 1 -line sequentia output 29.97 fps / Binning: F2 -line sequential output 59.94 fps
Video output	1.0Vp-p, sync negative, 75Ω unbalanced
Horizontal frequency	15.734 KHz
Output signal frequency	29.97 Hz (Normal mode)/59.94 Hz (Bininning mode)
Horizontal resolution	500TV lines
Sensitivity	400 lx F8 (γ= OFF, FIX GAIN (0 dB))
Minimum illumination	0.5 lx (F1.4, γ= OFF, GAIN +18 dB)
Video S/N ratio	58 dB
Gain	Fixed/Manunally adjustable
Gamma	OFF (γ =1) (fixed)
White clip	820 mV ± 70mV
Shutter mode	Normal shutter, Restart/Reset, External trigger shutter (Mode1/Mode2)
Normal shutter speed	1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/8,000, 1/15,000 s
External trigger shutter	DIP switch settings: 1/100, 1/125, 1/250, 1/500, 1/1,000, 1/2,000, 1/4,000, 1/10,000, 1/25,000, 1/50,000, 1/100,000 s
	Trigger pulse width settings: 1/4 to 1/100,000 s
External trigger	Polarity: +, Width: 2 μs to 250 ms, Input impedance: 10kΩ or more (H: +2 to 5.0V, L: 0 to +0.6V)
Pin Assignment	Correspondence to EIAJ compliant 12PIN connector pin assignment Unavailable (No.8 pin: Trigger input (G), No.9 pin: Trigger input,
	No.10 pin: GRD, No.11pin: +12V) Pins No.10 and 11 are not connected inside the camera
Power requirements	DC 12 V (+10.5 V to +15.0 V)
Power consumption	2.2 W
Dimensions	CHU: 22 (W) x 22 (H) x 30 (D) mm CCU: 29 (W) x 29 (H) x 67 (D) mm
Mass	CHU: 40 g CCU: 100 g
Operating temperature	-5 to +45 °C
Storage temperature	-30 to +60 °C
Performance guarantee temperature	0 to +40 °C
Operating humidity	20 to 80 % (no condensation)
Storage humidity	20 to 95 % (no condensation)
Vibration resistance	10 G (20 Hz to 200 Hz 20 minutes for each direction - x,y,z)
Shock resistance	70 G
MTBF	73,800 hrs. (approx. 8.4 years)
Regulatory compliance	UL6500, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326
Supplied accessories	Lens mount cap (1), Operating instructions (1), Dedicated cable (1), Ferrite core (1)

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

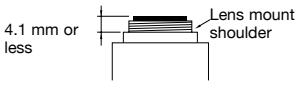
Location and Function of Parts and Controls


① Lens mount (NF-mount)
② Reference holes for locking the camera/ Tripod screw holes (head unit)
④ Reference holes for locking the camera/Tripod screw holes (control unit)
Progressive CAMERA MODULE
④ Reference holes for locking the camera/Tripod screw holes (control unit)
③ Connector for the special cable
② Reference holes for locking the camera/ Tripod screw holes (head unit)

① Lens mount (NF-mount)
Install an NF mounted lens or optical device, e.g., the standard lens VCL-12S12XM. If you install a C-mount lens on the XC-56BB, you will need the C-mount adaptor LO-999CMT.

Note

For installing a C-mount lens on the XC56BB



- If you install a C-mount lens on the XC56BB, you will need the C-mount adaptor LO-999CMT (sold separately). Be sure that the lens does not project more than 4.1 mm from the lens mount.
- For setting the camera when using C-mount adaptor, fix the lens mount (C-mount) instead of fixing the camera head in order to avoid applying unnecessary forces to the camera head.
- Avoid using C-mount adaptor in the places where vibrations or shocks are applied often. Doing so will damage the equipment or loosen the connection.

② Reference holes for locking the camera/Tripod screw holes (head unit)
You can attach a tripod to the reference holes (4) on the bottom. You will need a tripod adapter VCT-333I to install the tripod.
There are two more reference holes on the front of the top surface.

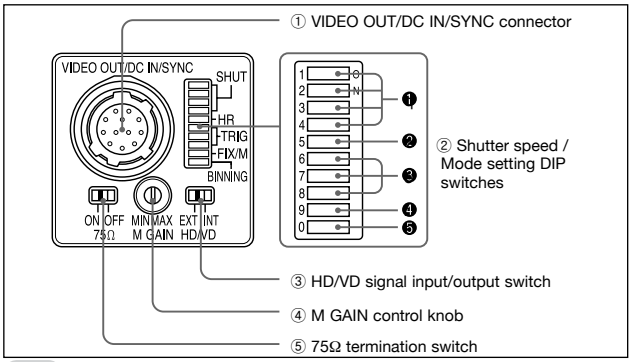
Note

- The XC-56BB head unit (CHU) must have the same serial number as the control unit (CCU).
- Do not connect or disconnect the supplied cable while the power is turned on, otherwise the camera may be damaged.

③ Connector for the special cable
Connect the head unit and the control unit with the supplied cable.

④ Reference holes for locking the camera/Tripod screw holes (control unit)
High-precision screw holes for locking the camera onto the lens mounted surface. Locking the camera minimizes optical axis deviation. For details, see the Application Guide. You can attach a tripod to the reference holes on the bottom of the head unit. You will need a tripod adapter VCT-55I to install the tripod. There are two more reference holes on the front of the top surface.

Rear Panel



Note
Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① VIDEO OUT/DC IN/SYNC (video output/DC power/sync input signal) connector (12-pin connector)
Connect a CCXC-12P05N camera cable to this connector to obtain power from the +12 V DC power supply and also to enable video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals (HD/VD signals).

② Shutter speed/Mode setting DIP switch

❶ Shutter speed (bits 1-4)
Set an appropriate shutter speed (factory setting: OFF).

❷ Partial scan mode switch (bit 5)
The factory setting of this switch is Partial scan OFF. If you turn this switch ON to use high-rate scan mode, you also need to make pulse rate settings.

❸ Restart reset/External trigger shutter mode switch (bits 6 to 8)
By inputting an external restart/reset signal, you can capture the information of single screens at arbitrary timing. By inputting an external trigger signal, you can capture fast-moving objects at precise locations. The factory settings for these switches are for normal operation.

❹ Gain switch (bit 9)
This switch selects FIX (fixed) or MANUAL (manual adjustment) (factory setting: FIX (left side)).

❺ Binning mode switch (bit 0)
Switches the video signal output mode between binning OFF and binning ON (factory setting: OFF).

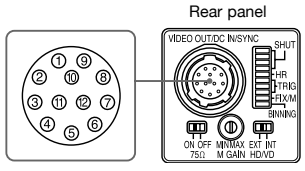
③ HD/VD signal input/output switch
Set the switch to INT to output HD/VD signals from the camera module.Set the switch to EXT to input HD/VD signals from an external unit (factory setting: EXT).

Note
Even when the switch is set to EXT, the camera module operates in internal synchronization mode unless an external HD signal is input. In this case, however, the camera module will not output internal sync signals.

④ M GAIN (Manual Gain) control knob
If you have selected MANUAL (manual adjustment) with DIP switch 4, this knob adjusts the gain. The dimensions of the groove on the knob are 0.5 (W) X 1.9 (L) X 0.45 (D)mm.
Use a screwdriver that is appropriate for these dimensions.
The knob can be rotated 260 degrees. Do not rotate the knob over the stopper on the limit point.

⑤ 75Ω termination switch
Turn this to OFF when not terminating the external sync signal (factory setting: ON).

Connector Pin Assignments



Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	—	—	—	—
9	—	—	—	Trigger pulse input (Signal)
10	—	—	—	—
11	—	—	—	—
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Ground)*

* Common ground for pins 7, 10, and 11

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

*1 The electronic shutter cannot be used in restart/reset mode.
*2 Partial scan can be used in restart/reset mode and in external trigger shutter mode 1.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal Shutter	Other modes*
8	8

* "Other modes" refers to restart/reset mode and external trigger shutter mode.

●Normal shutter speed settings

1/125	1/250	1/500	1/1000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/2000	1/4000	1/8000	1/15000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/100			
1 2 3 4			

(Unit: seconds)

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture first-moving objects clearly. Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2. When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.

Mode 1	Mode 2
6 7 8	6 7 8

Partial scannig

OFF	ON
5	5

(Partial mode is compatible with Mode 1 only.)

Note

High-rate scan mode cannot be used while in external trigger shutter mode 2.
There are two modes for the timing in which video signals are obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

- The video signal is synchronized with the external VD signal when an external HD*/VD signal is input.
- The video signal is synchronized with an internal VD signal when no external HD*/VD signal is input.

* External or internal synchronization is selected automatically depending on the presence or absence of external HD input.

●Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

To Set the External Trigger Shutter

There are two ways to set the shutter speed.

●Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to OFF.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.
Exposure time = Trigger pulse width + 8 μsec

Mode 1 (Non-reset mode)

1 2 3 4

Mode 2 (Reset mode)

1 2 3 4

Note

An incorrect video signal will be output if you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely.

●Using the DIP switches on the rear panel

For shutter speeds, see the following table.

Mode 1 (Non-reset mode)/Mode 2 (Reset mode)

1/125	1/250	1/500	1/1000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/2000	1/4000	1/10000	1/25000
1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
1/50000	1/100000	1/100	
1 2 3 4	1 2 3 4	1 2 3 4	

(Unit: seconds)

Restart/Reset

To Set Restart/Reset Mode

This mode allows you to capture the information on single screens at any time by externally inputting restart/reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.
To use restart/reset mode and Partial scan mode simultaneously, set the Partial scan mode switch (5) to ON (right side).

R/R
6 7 8

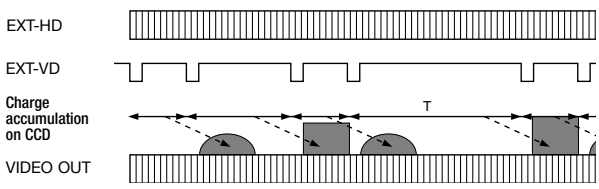
Partial scan

OFF	ON
5	5

Long Exposure

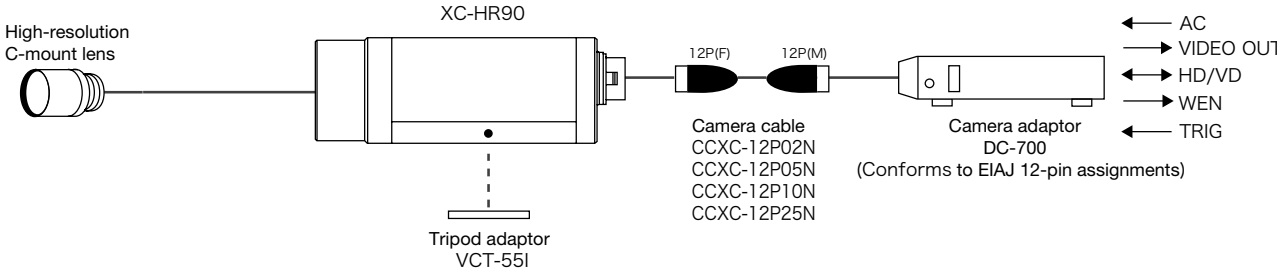
The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Example of input timing chart

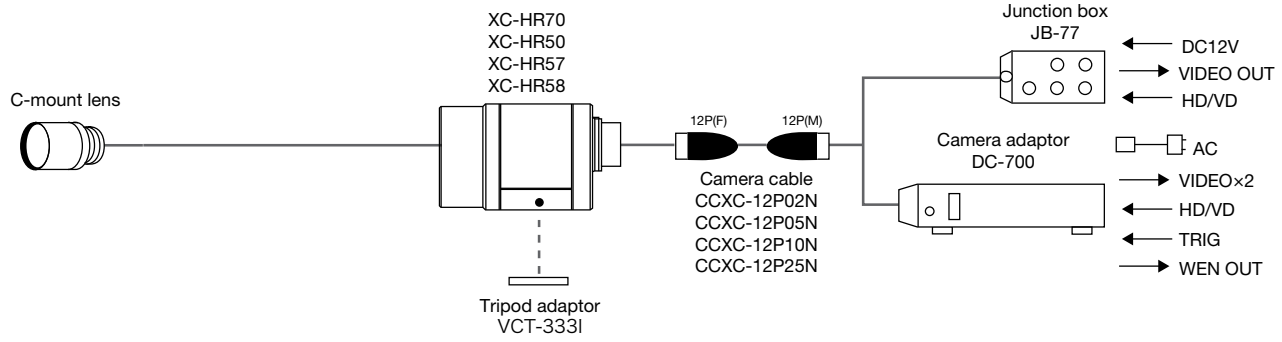


Connection Diagram

XC-HR90



XC-HR70/XC-HR50/XC-HR57/XC-HR58



○ : Usable × : Not usable

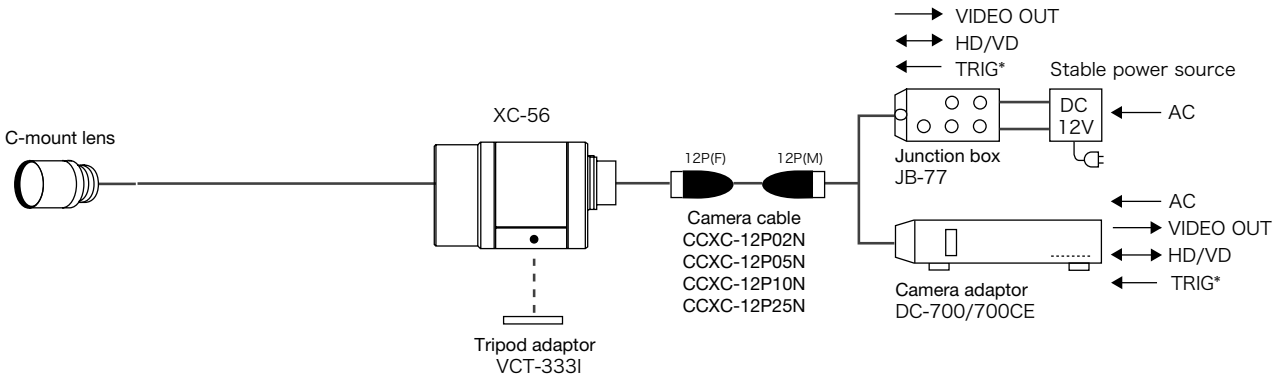
XC-HR series (XC-HR70/HR50/HR57/HR58)	JB-77
Normal	○
Normal shutter	○
Restart/reset (R/R)	○
External trigger shutter	×
WEN OUT	×

Note

When using the JB-77, not all of the XC-HR series functions can be used. See the table on the right.

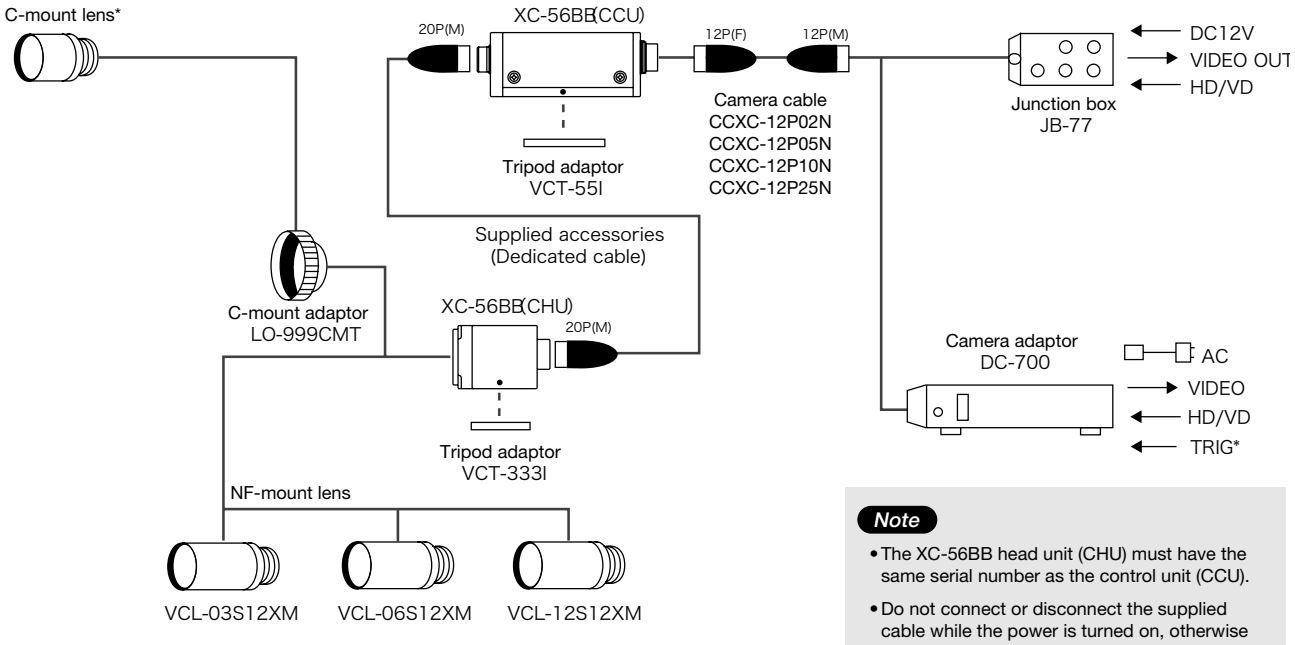
Connection Diagram

XC-56



To operate the camera by inputting an trigger signal,
* Use Junction box JB-77 and commercial stabilized power supply, and input a trigger signal to CLOCK OUT connector of JB-77.
* Input a trigger signal to Video connector 2 of Camera adaptor DC-700/700CE

XC-56BB



* To use the C-mount lens, attach the C-mount adaptor and connect to the camera.

Note

- The XC-56BB head unit (CHU) must have the same serial number as the control unit (CCU).
- Do not connect or disconnect the supplied cable while the power is turned on, otherwise the camera may be damaged.

To operate the camera by inputting an trigger signal,
* Use Junction box JB-77 and commercial stabilized power supply, and input a trigger signal to CLOCK OUT connector of JB-77.
* Input a trigger signal to Video connector 2 of Camera adaptor DC-700/700CE

XC-ST70/ST70CE
XC-ST50/ST50CE
XC-ST51/ST51CE
XC-ST30/ST30CE

TV Format Output | *1 2/3 Type CCD | *2 1/3 Type CCD | *3 1/2 Type CCD | C Lens Mount | VS Output | HD VD External Sync

VS External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter

*1 :XC-ST70/ST70CE
*2 :XC-ST30/ST30CE
*3 :XC-ST50/ST50CE/ST51/ST51CE

Connection Diagram P88

Outline

The XC-ST Series cameras incorporate the latest CCD and signal processing technologies into a compact black and white camera module. A new external trigger design allows the electronic shutter speed to be freely specified by the width of an external trigger pulse or by a switch setting on the rear panel of the camera. These cameras are also user-friendly, with all switch settings located on the rear panel. Moreover, the XC-ST Series have the exact same dimensions, simplifying space requirements and making it easy to interchange them if necessary. These features, along with high picture quality and high shock and vibration tolerance make the XC-ST Series cameras ideal for demanding machine vision applications.

Features

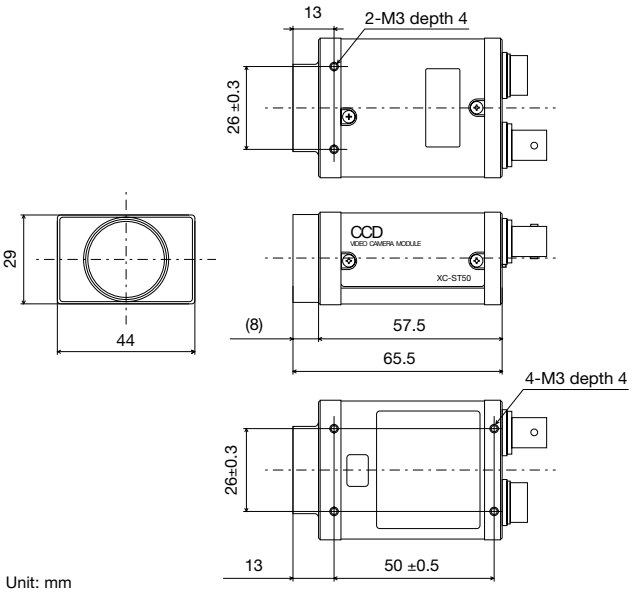
- XC-ST70/ST70CE: 2/3 type IT CCD
- XC-ST51/ST51CE/ST50/ST50CE: 1/2 type IT CCD
- XC-ST30/ST30CE: 1/3 type IT CCD
- Small and lightweight: 44 (W) x 29 (H) x 57.5 (D) mm, 110 g
- Flexible trigger shutter functions
- High sensitivity: XC-ST51/ST51CE: 0.2 lx (F1.4)
  XC-ST70/ST70CE/ST50/ST50CE/
  ST30/ST30CE: 0.3 lx (F1.4)
- 2:1 interlaced/non-interlaced (during external sync input)
- High S/N ratio : 60 dB (XC-ST70/ST50/ST51)
  : 58 dB (XC-ST30)
- Electronic shutter function (1/100 to 1/10,000 sec.)
- Synchronization: internal/external (HD/VD, VS)
- Restart/reset function
- Frame/field exposure
- High shock and Vibration tolerant

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-ST70I

Dimensions

Camera body of all XC-ST models



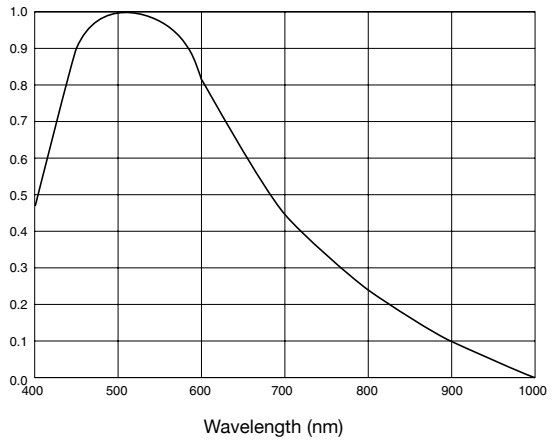
Unit: mm

Spectral Sensitivity Characteristics

●XC-ST70

(Typical Values)

Relative sensitivity

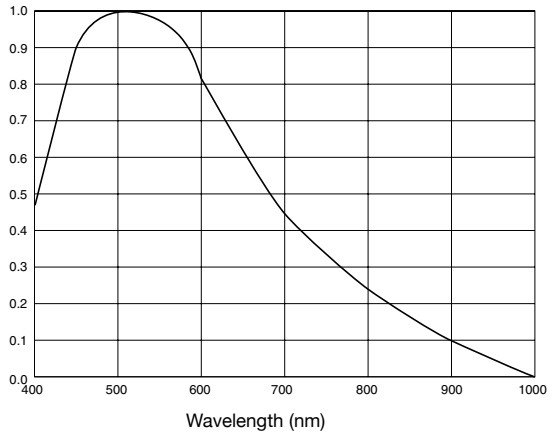


(Lens characteristics and light source characteristics excluded.)

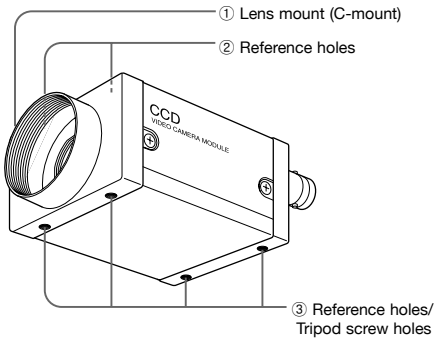
●XC-ST50/XC-ST51/XC-ST30

(Typical Values)

Relative sensitivity

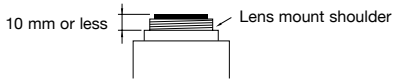


(Lens characteristics included, and light source characteristics excluded.)



① Lens mount (C-mount)
Attach any C-mount lens or other optical equipment.

Note
The lens must not project more than 10 mm from the lens mount.



② Reference holes (at the top)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

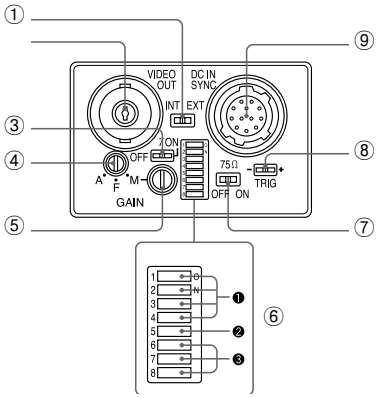
③ Reference holes/Tripod screw holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.
You can install the camera on a tripod. To install on a tripod, you will need to install the VCT-ST70I tripod adaptor using the reference holes on the bottom of the camera.

Specifications

	XC-ST70	XC-ST50	XC-ST51	XC-ST30	XC-ST70CE	XC-ST50CE	XC-ST51CE	XC-ST30CE
Image device	2/3 type IT CCD	1/2 type IT CCD		1/3 type IT CCD	2/3 type IT CCD	1/2 type IT CCD		1/3 type IT CCD
Signal system	EIA				CCIR			
Effective picture elements	768 (H) x 494 (V)				752 (H) x 582 (V)			
Effective lines	752 (H) x 485 (V)				736 (H) x 575 (V)			
Cell size (µm)	11.6 (H) x 13.5 (V)	8.4 (H) x 9.8 (V)		6.35 (H) x 7.4 (V)	11.6 (H) x 11.2 (V)	8.6 (H) x 8.3 (V)		6.5 (H) x 6.25 (V)
Horizontal frequency	15.734 kHz				15.625 kHz			
Vertical frequency	59.94 Hz				50 Hz			
Lens mount	C mount							
Sync system	Internal/External							
External Sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)							
External Sync frequency	±1 % (in horizontal sync frequency), VS							
Jitter	less than ±20 nsec (external horizontal frequency)							
Scanning system	2:1 Interlaced							
Video output	1.0 Vp-p, negative, 75 Ω unbalanced							
Horizontal resolution	570 TV lines				560 TV lines			
Sensitivity	400 lx, F8 (γ= ON, 0 dB)	400 lx, F11 (γ= ON, 0 dB)		400 lx, F5.6 (γ= ON, 0 dB)	400 lx, F8 (γ= ON, 0 dB)	400 lx, F11 (γ= ON, 0 dB)		400 lx, F5.6 (γ= ON, 0 dB)
Minimum illumination	0.3 lx (F1.4, AGC ON)	0.2 lx (F1.4, AGC ON)		0.3 lx (F1.4, AGC ON)	0.3 lx (F1.4, AGC ON)	0.2 lx (F1.4, AGC ON)		0.3 lx (F1.4, AGC ON)
S/N ratio	60 dB			56 dB	58 dB			54 dB
Gain	AGC/Fixed/Manual (adjustable on the rear panel)							
Gamma	ON/OFF (adjustable on the rear panel)							
Normal shutter	1/100 to 1/10,000 s				1/120 to 1/10,000 s			
External trigger shutter	1/4 to 1/10,000 s				1/4 to 1/8,000 s			
Power requirements	DC12 V (+10.5 to 15 V)							
Power consumption	2.1 W	2.0 W		1.9 W	2.1 W	2.0 W		1.9 W
Dimensions	44(W) x 29(H) x 57.5(D) mm							
Mass	105 g	110 g			105 g	110 g		
Operating temperature/humidity	-5 ˚C to +45 ˚C / 20 to 80 % (no condensation)							
Storage temperature/humidity	-30 ˚C to +60 ˚C / 20 to 95 % (no condensation)							
Performance guarantee temperature	0 to +40 ˚C							
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction – x,y,z)							
Shock resistance	70 G							
MTBF	70,600 hrs. (approx. 8.1 years)							
Regulatory compliance	UL6500, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326							
Supplied accessories	Lens mount cap (1), Operating instructions (1)							

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel



① **HD/VD signal input/output switch**
Set the switch to INT to output HD/VD signals from the camera module.Set the switch to EXT to input HD/VD signals from an external unit. (Factory setting: EXT)

VIDEO OUT (Video signal output) connector (BNC)
You can use this connector for video signal output from the camera module.

③ **γ compensation ON/OFF switch**
Turn on this switch for g compensation. (Factory setting: OFF)

④ **GAIN switch**
This switch selects AGC (A), fixed gain (F), or manual gain control (M). (Factory setting: F)

⑤ **Manual gain control**
Adjust the gain using this control. GAIN switch ④ must have been set to M (Manual).

⑥ **Shutter speed/Mode setting DIP switch**

q **Shutter speed (bits 1 to 4)**
Set an appropriate shutter speed. (Factory setting: Shutter off)

w **High-rate scan mode switch (bit 5)**
Factory setting: FRAME

e **Restart reset/External trigger shutter mode switch (bits 6 to 8)**
Factory setting: Normal

Note

- Do not use any other settings for Restart reset/External trigger shutter mode except those shown in page 12. Using other settings may cause the camera to malfunction.
- If you set the External trigger shutter mode, set 0 in bits 1 – 4.

⑦ **75 Ω termination switch**
Turn off if you do not terminate. (Factory setting: ON)

⑧ **TRIG polarity switch**
Select + or – according to the trigger pulse input from an external unit. (Factory setting: +)

⑨ **DC IN/SYNC (DC power input/sync signal I/O) connector (12-pin)**
Connect a CCXC-12P05N camera cable to this connector the +12 V DC power supply and the video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals.

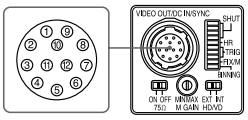
Factory Mode Settings of Rear Panel

No.	Switch		Factory setting mode
①	HD/VD signal input/output switch		EXT
③	γ compensation ON/OFF switch		OFF
④	GAIN switch		F
⑤	Manual gain control		- 1)
⑥	Shutter speed/Mode setting DIP switches	Shutter speed (bits 1 - 4)	Shutter OFF
		Potential accumulation mode (bit 5)	FRAME
		Restart reset/External trigger shutter mode switch (bits 6 - 8)	Normal
⑦	75 termination switch		ON
⑧	TRIG polarity switch		+

1) This unit is shipped from the factory with the GAIN switch being set to F (fix), so the Manual gain control knob is not operative unless the switch setting is changed. When the GAIN switch is set to M (manual), you can rotate this knob to adjust gain over the range 0 to 18 dB.

Connector Pin Assignments

Rear panel



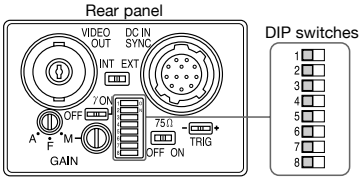
Pin No.	Camera sync output	External mode (HD/VD)	External mode (VS)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	-	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	-	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	VS input (Signal)	Reset (Signal)	VD input (Signal)
8	-	-	-	-	-
9	-	-	-	-	-
10	-	-	-	-	WEN output (Signal)
11	-	-	-	-	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	VS input (Ground)	Reset (Ground)	Reset (Ground)*

* Common ground for pins 7, 10, and 11

About the Electronic Shutter

There are two shutter types: normal shutter and external trigger shutter. Select them with the DIP switches on the rear panel.

DIP Switches on the Rear Panel

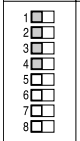
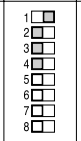
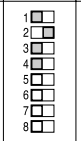
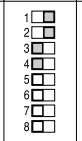
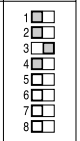
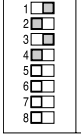
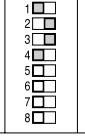
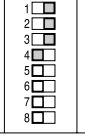
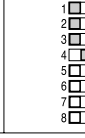


Switches 1 to 4: Shutter speed
Switch 5: Potential accumulation mode
Switches 6 to 8: Restart reset/External trigger shutter mode switch

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Normal shutter speed settings

Shutter OFF	1/125	1/250	1/500	1/1000
				
1/2000	1/4000	1/10000	Flickerless1) 1/100 (EIA) 1/120 (CCIR)	
				

(Unit: second)

* If you set the mode to flickerless, the positions of DIP switches 1 to 3 are optional.

Note

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

External Trigger Shutter

Inputting an external trigger pulse enables the camera to capture fast-moving objects clearly with precise timing.
Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2.
When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.
There are two modes for the timing in which video signals are obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

– The video signal is synchronized with the external VD signal when an external HD/VD signal is input.
– The video signal is synchronized with an internal VD signal when no external HD/VD signal is input.

●Mode 2 (Reset mode)

In this mode, an internal VD is reset, then a video signal is output a certain period of time after trigger pulse input.

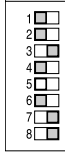
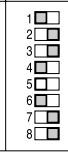
To Set the External Trigger Shutter

There are two ways to set the shutter speed.

●Using the DIP switches on the rear panel

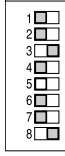
For shutter speeds, see the following table.

Mode 1 (Non-reset mode)

1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: second)

Mode 2 (Reset mode)

1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: second)

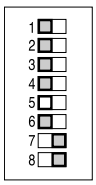
Note

The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

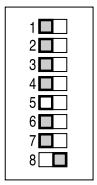
●Using trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to 0.
You can obtain an arbitrary shutter speed by setting the trigger pulse width within the range of 2 msec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)



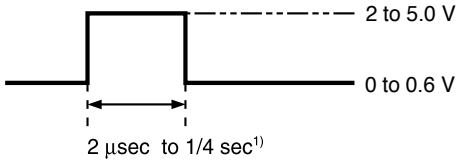
Exposure time = Trigger pulse width + 97 µsec (EIA)
Trigger pulse width + 120 µsec (CCIR)

Note

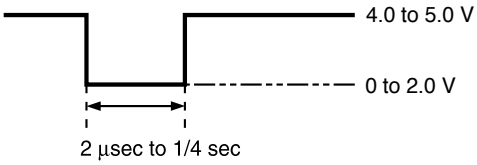
- The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.
- If you input another trigger pulse before the video signal output for the previous trigger pulse is completely output, an incorrect video signal will be output.

Specifications of trigger pulse

●When using a trigger pulse like shown below, set the TRIG polarity selector switch on the rear panel to + :



●When using a trigger pulse like shown below, set the TRIG polarity selector switch on the rear panel to - :



ºC Input impedance: 10 k or more.

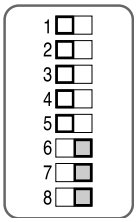
ºC The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

To Set Restart/Reset Mode

The information on one screen can be extracted at any time by externally inputting Restart/Reset signals (HD/VD). To enter this mode, set the trigger shutter switches (6 to 8) on the rear panel of the camera as shown in the figure below.
The Reset/Restart mode is especially effective for frame image output with long exposure or a strobe light.

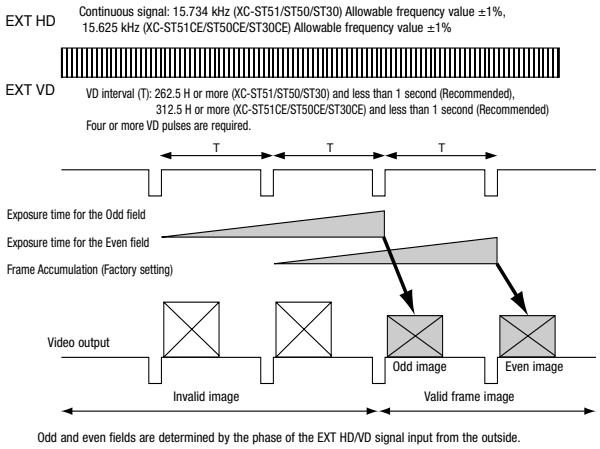
DIP switches



Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in highly sensitive image capture. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe the trail of a moving object. Extend the VD interval (T) between external VD pulses.

Sample input timing chart 1


EXT HD
Continuous signal: 15.734 kHz (XC-ST51/ST50/ST30) Allowable frequency value ±1%,
15.625 kHz (XC-ST51CE/ST50CE/ST30CE) Allowable frequency value ±1%
EXT VD
VD interval (T): 262.5 H or more (XC-ST51/ST50/ST30) and less than 1 second (Recommended),
312.5 H or more (XC-ST51CE/ST50CE/ST30CE) and less than 1 second (Recommended)
Four or more VD pulses are required.
T
T
T
Exposure time for the Odd field
Exposure time for the Even field
Frame Accumulation (Factory setting)
Video output
Odd image
Even image
Invalid image
Valid frame image

Odd and even fields are determined by the phase of the EXT HD/VD signal input from the outside.

XC-ES50/ES50CE
XC-ES51/ES51CE
XC-ES30/ES30CE

TV Format Output | 1/3 Type CCD *1 | 1/2 Type CCD *2 | C Lens Mount | VS Output | HD VD External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter

*1 :XC-ES30/ES30CE
*2 :XC-ES50/ES50CE/ES51/ES51CE

Connection Diagram P88

Outline

The XC-ES series is a small-sized lightweight monochrome camera module designed as an input device for image processing, realized through the newest high-density packaging.
The downsized the main body allows to set the XC-ES series easily at the places where is difficult to set the existing devices

Features

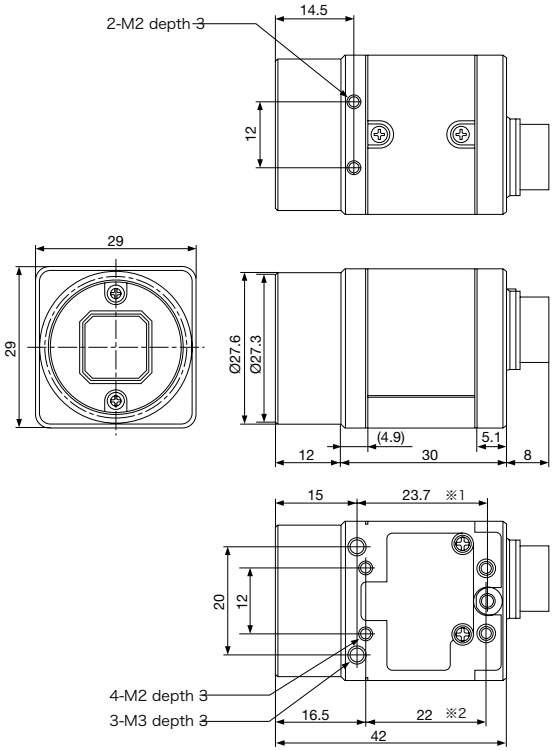
- XC-ES30/ES30CE :1/3 type IT CCD
- XC-ES50/ES50CE :1/2 type IT CCD
- XC-ES51/ES51CE :1/2 type IT CCD High sensitivity
- External trigger shutter function
  XC-ES50/ES51/ES30 : 1/4 to 1/10,000 sec.
  XC-ES50CE/ES51CE/ES30CE : 1/4 to 1/8,000 sec.
- Electronic shutter function
  XC-ES50/ES51/ES30 : 1/100 to 1/10.000 sec.
  XC-ES50CE/ES51CE/ES30CE : 1/120 to 1/10.000 sec.
- High S/N ratio: 60 dB
- 2:1 Interlaced/non-interlaced
- Frame/field accumulation
- Restart/reset function
- Sync system: Internal/external (HD/VD)
- High shock and vibration resistance

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-333I

Dimensions

Camera body of all XC-E models



Unit: mm

*1: M3 screw size
*2: M2 screw size

Notice

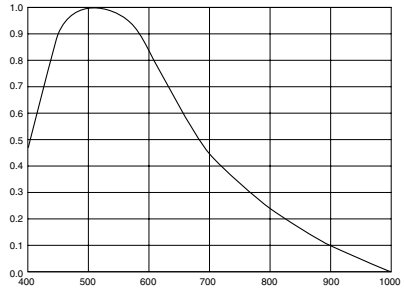
From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles.
The outside dimensions will be changed from the following serial numbers.
XC-ES50/XC-ES30: 250001~
XC-ES50CE/ES30CE: 550001~
XC-ES51:150001~
XC-ES51CE:450001~

Spectral Sensitivity Characteristics

●XC-ES50/XC-ES51/XC-ES30

(Typical Values)

Relative sensitivity

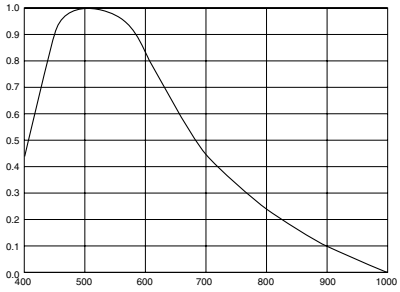


Wavelength (nm)

●XC-ES50CE/XC-ES51CE/XC-ES30CE

(Typical Values)

Relative sensitivity

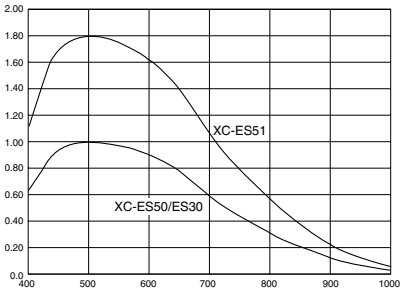


Wavelength (nm)

●XC-ES50, XC-ES51/XC-ES30

(Comparison sensitivity)

Relative sensitivity

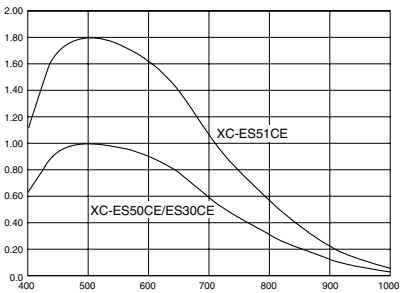


Wavelength (nm)

●XC-ES50CE, XC-ES51CE/XC-ES30CE

(Comparison sensitivity)

Relative sensitivity



Wavelength (nm)

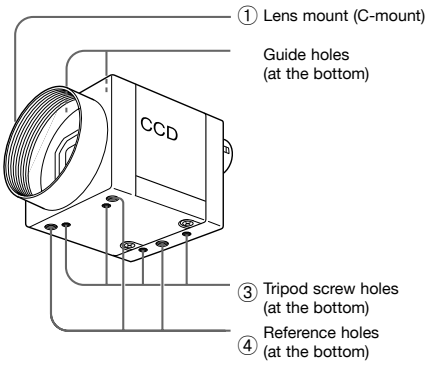
(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-ES50	XC-ES51	XC-ES30	XC-ES50CE	XC-ES51CE	XC-ES30CE
Image device	1/2 type IT CCD		1/3 type IT CCD	1/2 type IT CCD		1/3 type IT CCD
Signal system	EIA			CCIR		
Effective picture elements	768 (H) x 494 (V)			752 (H) x 582 (V)		
Effective lines	752 (H) x 485 (V)			736 (H) x 575 (V)		
Cell size (µm)	8.4 (H) x 9.8 (V)		6.35 (H) x 7.4 (V)	8.6 (H) x 8.3 (V)		6.5 (H) x 6.25 (V)
Horizontal frequency	15.734 kHz			15.625 kHz		
Vertical frequency	59.94 Hz			50 Hz		
Lens mount	C mount					
Sync system	Internal/External (auto)					
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)					
External sync frequency	±1 % (in horizontal sync frequency)					
Jitter	less than ±20 nsec					
Scanning system	525 lines 2:1 Interlaced (Automatic switching according to input signal)					
Video output	1.0 Vp-p, negative, 75 Ω unbalanced					
Horizontal resolution	570 TV lines			560 TV lines		
Sensitivity	400 lx F5.6	400 lx F8	400 lx F4	400 lx F5.6	400 lx F8	400 lx F4
	(γ=ON, MIN GAIN, No IR cut filter)					
Minimum illumination*2	0.3 lx	0.2 lx	0.3 lx	0.3 lx	0.2 lx	0.3 lx
S/N ratio	60 dB					
Gain	AGC/Manual (Adjustable on the rear panel)					
Gamma	ON/OFF (Adjustable on the rear panel)					
Normal shutter	1/100 to 1/10,000 s			1/120 to 1/10,000 s		
External trigger shutter*3	1/4 to 1/10,000 s			1/4 to 1/8,000 s		
Power requirements	DC 12 V (+9 to16 V)					
Power consumtion	1.6 W		1.4 W	1.6 W		1.4 W
Dimension (W) x (H) x (D)	29 x 29 x 30mm					
Mass	50 g					
Operating temperature/humidity	-5 ˚C to +45 ˚C / 20 to 80 % (no condensation)					
Storage temperature/humidity	-20 ˚C to +60 ˚C / 20 to 95 % (no condensation)					
Performance guarantee temperature	0 to +40 ˚C					
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction – x,y,z)					
Shock resistance	70 G					
MTBF	126,469 hrs.					
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326					
Supplied accessories	Lens mount cap (1), Operating instructions (1)					

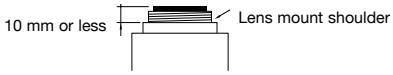
*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.
*2 (F1.4, AGC ON, without IR cut filter) *3 Using Dip switch on the rear panel or Using trigger pulse width

Location and Function of Parts and Controls



① Lens mount section (C mount)
Attach any C-mount lens or other optical equipment.

Note
Be sure that the lens does not project more than 10 mm from the lens mount.

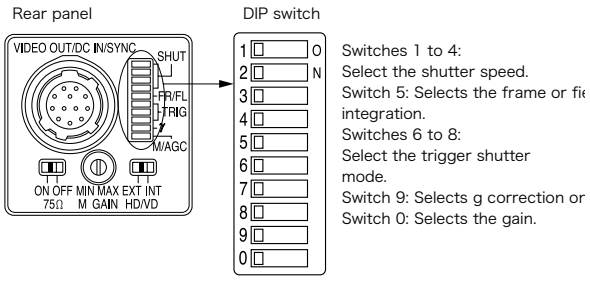


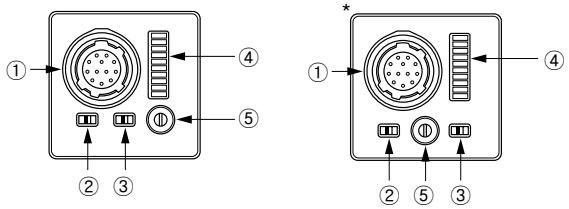
Guide holes (at the top)
These screw holes help to lock the camera module.

③ Tripod screw holes (at the bottom)
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

④ Reference holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Rear Panel





* The rear panel is different for the serial numbers shown below.
XC-ES50/ES30 :200001~
XC-ES50CE/ES30CE :500001~

① 12-pin multi-connector
DC IN/HD/VD (DC power/sync signal input) VIDEO OUT terminal.

② 75Ω termination selector switch

③ HD/VD input-output selector switch

④ Shutter speed/mode setting DIP switch

⑤ Volume control switch
This switch can be changed in the range of Switch 0 to 18 dB when the GAIN switch is set to "M".
*During factory setting, this switch is adjusted to the mechanical center.

Note
When setting DIP switch 5 to the frame integration, set the volume control switch 8 to the MAX side from the mechanical center (because of CCD characteristics).

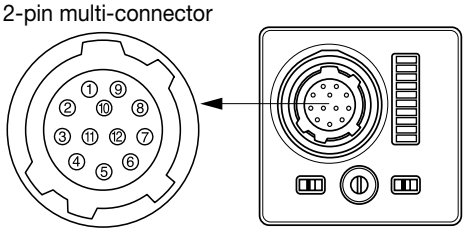
Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

Factory Mode Settings of Rear Panel

No.	Switch	Factory-setting mode
②	75 Ω termination selector switch	ON
③	HD/VD input-output selector switch	EXT
④	Shutter speed/mode setting DIP switch	
	Switches 1 to 4: Select the shutter speed.	OFF
	Switch 5: Selects the frame or field integration.	FRAME
	Switches 6 to 8: Select the trigger shutter mode.	Normal
	Switch 9: Selects correction on/off.	OFF
	Switch 0: Selects the gain.	Manual
⑤	Volume control switch	Mechanical center

Connector Pin Assignments

12-pin multi-connector



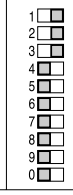
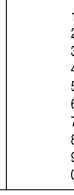
Pin No.	External HD/VD synchronization	Internal HD/VD synchronization
1	GND	GND
2	+12 V	+12 V
3	GND	GND
4	VIDEO output	VIDEO output
5	GND	GND
6	External HD input	Internal HD output
7	*1 External VD input	Internal VD output
8	GND	GND
9	–	–
10	*2 WEN output	*2 WEN output
11	TRIG input	TRIG input
12	GND	GND

*1: An input VD signal is required when the restart/reset mode is used.
*2: A WEN output signal is valid only in the external trigger shutter mode.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to clearly capture a high-speed moving object.

■ Setting of normal shutter speed

Shutter OFF	1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)	Flickerless* (EIA: 1/100 CCIR: 1/120)	
				

(Unit: second)

* In the flickerless mode, the normal shutter speed is 1/100 sec for XC-ES50/ES30 and XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30 CE and XC-EI50CE/EI30CE (CCIR).

Note

It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)

External Trigger Shutter

These modes are used to capture one image (one field) per trigger pulse. Set DIP switches 6, 7, and 8 on the rear panel to mode 1 or 2. (Refer to the table below.) When the trigger pulse width is 1/3 sec or more, the output signal is switched to a normal video signal.

There are two modes for timing in which a video signal is obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

– A video signal is synchronized with the external VD signal when an external HD/VD signal is input.

– A video signal is synchronized with an internal VD signal when no external HD/VD signal is input.

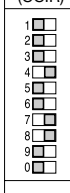
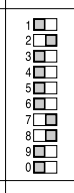
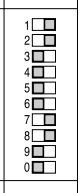
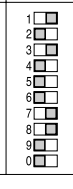
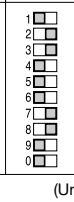
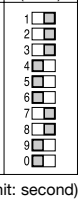
●Mode 2 (Reset mode)

In this mode, an internal video signal is output from a trigger pulse after a certain period of time.

■ Setting of external trigger shutter speed

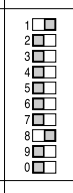
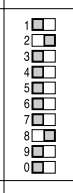
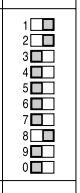
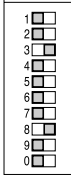
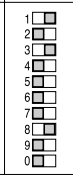
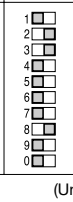
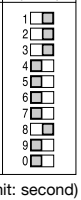
There are two ways to set the shutter speed.

Mode 1 (Non-reset mode)

*1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: second)

Mode 2 (Reset mode)

*1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: second)

* The external trigger shutter speed is set to 1/100 sec for XC-ES50/ES30, XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30CE, XC-EI50CE/EI30CE (CCIR).

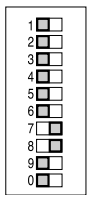
** The external trigger shutter speed is set to 1/10000 sec for XC-ES50/ES30, XC-EI50/EI30 (EIA) and 1/8000 sec for XC-ES50CE/ES30CE, XC-EI50CE/EI30CE (CCIR).

●Using trigger pulse width

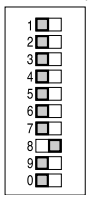
– Set DIP switches 1 to 4 on the rear panel to 0.

– An arbitrary shutter speed can be obtained by setting the trigger pulse width to the range of 2 msec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)

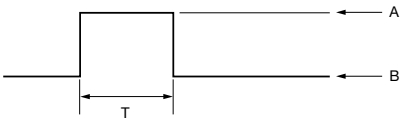


Exposure time = Trigger pulse width + 97 μsec (EIA)
120 μsec (CCIR)

Note

1. It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)
2. After a trigger pulse is input, a new trigger pulse must not be input before the video signal obtained by the trigger pulse has been output.

■ Specifications of trigger pulse



A: 4 to 5.0 V
B: 0 to 1.0 V
T: 2 μs to 1/4 s

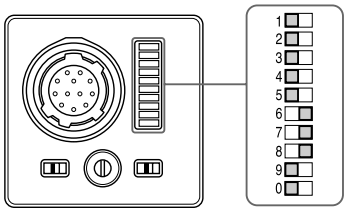
T: 2 ms to 1/4 s, 100 μs to 1/4 s when setting the shutter speed using DIP switch

* Input impedance: 10 kW or more

* The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

The information on one screen can be extracted at any time by inputting a restart/reset signal (HD/VD) from the outside. To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of a camera as shown in the table below. The setting is especially effective for the following operation.



B/W VIDEO CAMERA MODULE

XC-EI50/EI50CE
XC-EI30/EI30CE

TV Format Output | *1 1/3 Type CCD | *2 1/2 Type CCD | C Lens Mount | VS Output | HD VD External Sync | Restart Reset
Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter | Near-IR Sensitivity

*1:XC-EI30/EI30CE
*2:XC-EI50/EI50CE

Connection Diagram P88

Outline

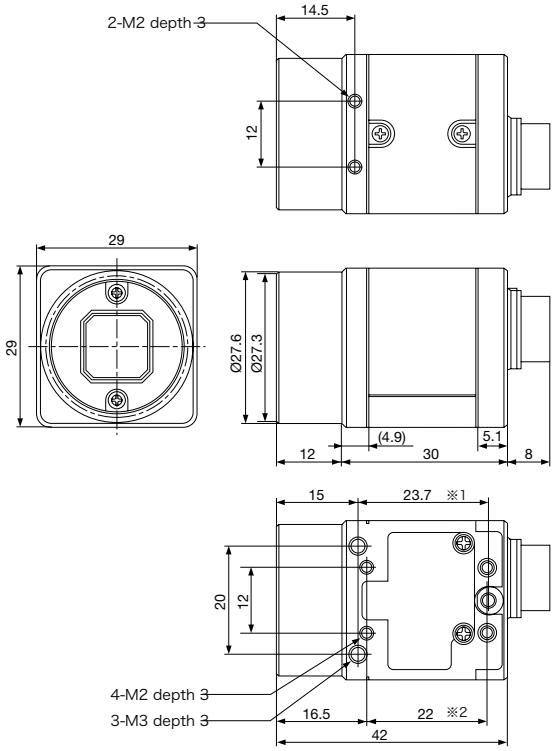
Like the XC-EI50/EI50CE and XC-EI30/EI30CE, the XC-ES50/ES30 is compact and lightweight and offers near-infrared sensitivity.
Extremely sharp images can be obtained when used under red LED illumination or in near-infrared light, such as in fun-duscopes.

Features

- XC-EI50/EI50CE: 1/2 type interline CCD
- XC-EI30/EI30CE: 1/3 type interline CCD
- Near-IR sensitivity
- High sensitivity: F1.4
  XC-EI50/EI50CE: 0.1 lx
  XC-EI30/EI30CE: 0.2 lx
- High S/N ratio: 60 dB
- Electronic shutter function (1/100 to 1/10,000 sec.)
- External trigger shutter function (1/4 to 1/10,000 sec.)
- 2:1 Interlaced/non-interlaced
- Frame/field accumulation
- Restart/reset function
- Sync system: Internal/external (HD/VD)
- High shock and vibration resistance

Dimensions

Camera body of all XC-E models



Unit: mm

*1: M3 screw size
*2: M2 screw size

Accessories

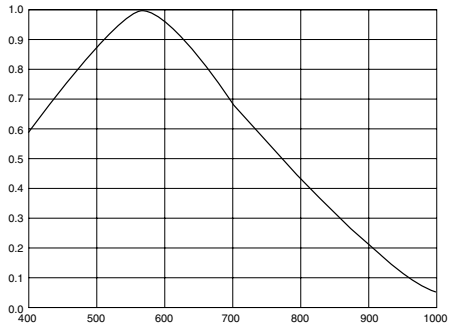
- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-333I

Spectral Sensitivity Characteristics

●XC-EI30

(Typical Values)

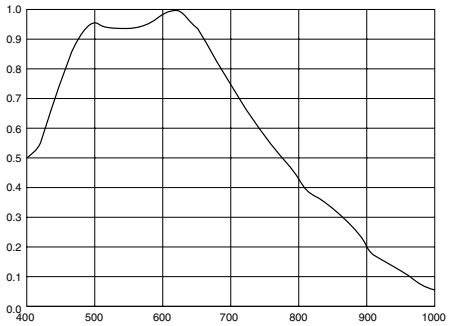
Relative sensitivity



●XC-EI50

(Typical Values)

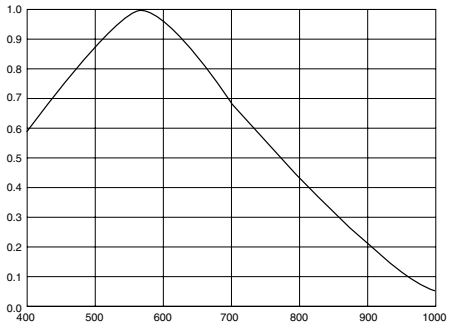
Relative sensitivity



●XC-EI30CE

(Typical Values)

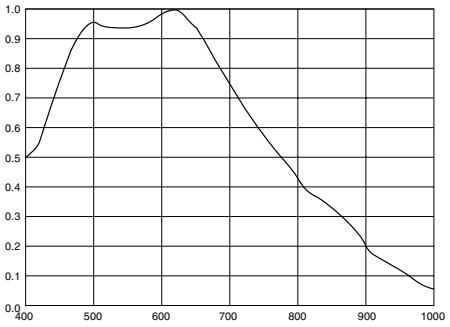
Relative sensitivity



●XC-EI50CE

(Typical Values)

Relative sensitivity



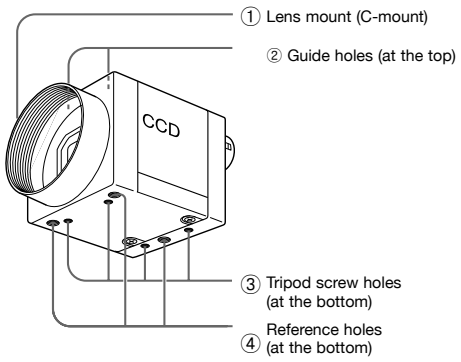
(Lens characteristics and light source characteristics excluded.)

Specifications

	XC-EI50	XC-EI50CE	XC-EI30	XC-EI30CE
Image device	1/2 type IT CCD		1/3 type IT CCD	
Signal system	EIA	CCIR	EIA	CCIR
Effective picture elements	768 (H) x 494 (V)	752 (H) x 582 (V)	768 (H) x 494 (V)	752 (H) x 582 (V)
Effective lines	752 (H) x 485 (V)	736 (H) x 575 (V)	752 (H) x 485 (V)	736 (H) x 575 (V)
Cell size (µm)	8.4 (H) x 9.4 (V)	8.6 (H) x 8.3 (V)	6.35 (H) x 7.4 (V)	6.5 (H) x 6.25 (V)
Horizontal frequency	15.734 kHz	15.625 kHz	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz	59.94 Hz	50 Hz
Lens mount	C mount			
Sync system	Internal/External (auto)			
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)			
External sync frequency	±1 % (in horizontal sync frequency)			
Jitter	less than ±20 nsec			
Scanning system	525 lines 2:1 Interlaced (automatic switching according to input signal)			
Video output	1.0 Vp-p, negative, 75 Ω unbalanced			
Horizontal resolution	570 TV lines	560 TV lines	570 TV lines	560 TV lines
Sensitivity	400 lx F11 (γ=ON, MIN GAIN, without IR cut filter)		400 lx F8 (γ=ON, MIN GAIN, without IR cut filter)	
Minimum illumination*2	0.1 lx		0.2 lx	
S/N ratio	60 dB			
Gain	AGC/Manual (adjustable on the rear panel)			
Gamma	ON/OFF (adjustable on the rear panel)			
Normal shutter	1/100 to 1/10,000 s	1/120 to 1/10,000 s	1/100 to 1/10,000 s	1/120 to 1/10,000 s
External trigger shutter*3	1/4 to 1/10,000 s	1/4 to 1/8,000 s	1/4 to 1/10,000 s	1/4 to 1/8,000 s
Power requirements	DC 12 V (+9 to16 V)			
Power consumtion	1.6 W		1.4 W	
Dimension (W) x (H) x (D)	29 x 29 x 30 mm			
Mass	50 g			
Operating temperature/humidity	-5 °C to +45 °C / 20 to 80 % (no condensation)			
Storage temperature/humidity	-20 °C to +60 °C / 20 to 95 % (no condensation)			
Performance guarantee temperature	0 to +40 °C			
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction – x,y,z)			
Shock resistance	70 G			
MTBF	126,469 hrs.			
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326			
Supplied accessories	Lens mount cap (1), Operating instructions (1)			

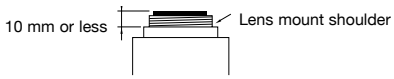
*1 Automatic switching in response to the presence of an input signal when the VS switch on the rear panel is set to EXT.
*2 (F1.4, AGC ON, without IR cut filter) **3 Using Dip switch on the rear panel or Using trigger pulse width

Location and Function of Parts and Controls



① Lens mount section (C mount)
A commercial C-mount lens or other optical equipment.

Note
Be sure that the lens does not project more than 10 mm from the lens mount.

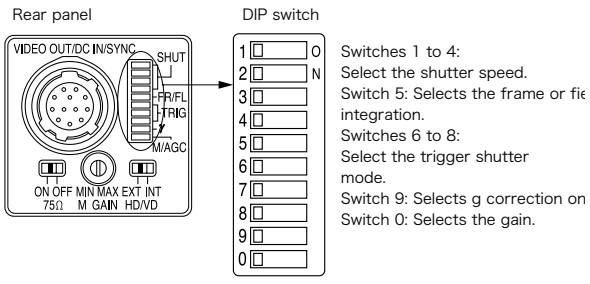


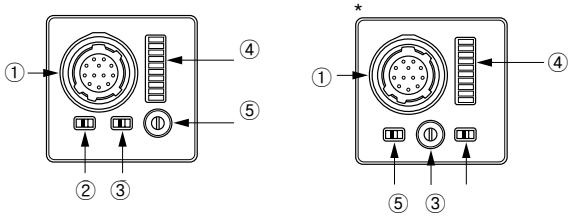
② Guide holes (at the top)
These screw holes help to lock the camera module.

③ Tripod screw holes (at the bottom)
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

④ Reference holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

Rear Panel





* The rear panel is different for the serial numbers shown below.
XC-ES50/ES30 :200001~
XC-ES50CE/ES30CE :500001~

① 12-pin multi-connector
DC IN/HD/VD (DC power/sync signal input) VIDEO OUT terminal.

② 75Ω termination selector switch

③ HD/VD input-output selector switch

④ Shutter speed/mode setting DIP switch

⑤ Volume control switch
This switch can be changed in the range of Switch 0 to 18 dB when the GAIN switch is set to "M".
*During factory setting, this switch is adjusted to the mechanical center.

Note
When setting DIP switch 5 to the frame integration, set the volume control switch 5 to the MAX side from the mechanical center (because of CCD characteristics).

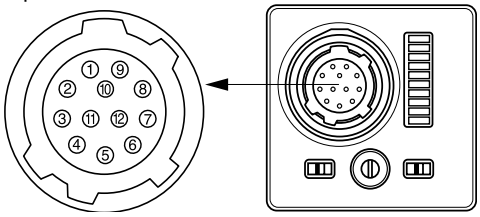
Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

Factory Mode Settings of Rear Panel

No.	Switch	Factory-setting mode
②	75 Ω termination selector switch	ON
③	HD/VD input-output selector switch	EXT
④	Shutter speed/mode setting DIP switch	
	Switches 1 to 4: Select the shutter speed.	OFF
	Switch 5: Selects the frame or field integration.	FRAME
	Switches 6 to 8: Select the trigger shutter mode.	Normal
	Switch 9: Selects correction on/off.	OFF
	Switch 0: Selects the gain.	Manual
⑤	Volume control switch	Mechanical center

Connector Pin Assignments

12-pin multi-connector



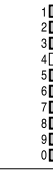
Pin No.	External HD/VD synchronization	Internal HD/VD synchronization
1	GND	GND
2	+12 V	+12 V
3	GND	GND
4	VIDEO output	VIDEO output
5	GND	GND
6	External HD input	Internal HD output
7	*1 External VD input	Internal VD output
8	GND	GND
9	–	–
10	*2 WEN output	*2 WEN output
11	TRIG input	TRIG input
12	GND	GND

*1: An input VD signal is required when the restart/reset mode is used.
*2: A WEN output signal is valid only in the external trigger shutter mode.

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to clearly capture a high-speed moving object.

■ Setting of normal shutter speed

Shutter OFF	1/125	1/250	1/500	1/1000
1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)	*Flickerless (EIA: 1/100 CCIR: 1/120)	
				

(Unit: second)

* In the flickerless mode, the normal shutter speed is 1/100 sec for XC-ES50/ES30 and XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30 CE and XC-EI50CE/EI30CE (CCIR).

Note

It is recommended to set DIP switch 5 for field selection.
(The field selection is about two times in sensitivity as high as the frame selection.)

External Trigger Shutter

These modes are used to capture one image (one field) per trigger pulse. Set DIP switches 6, 7, and 8 on the rear panel to mode 1 or 2. (Refer to the table below.) When the trigger pulse width is 1/3 sec or more, the output signal is switched to a normal video signal.

There are two modes for timing in which a video signal is obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

– A video signal is synchronized with the external VD signal when an external HD/VD signal is input.
– A video signal is synchronized with an internal VD signal when no external HD/VD signal is input.

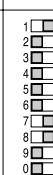
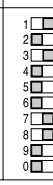
●Mode 2 (Reset mode)

In this mode, an internal video signal is output from a trigger pulse after a certain period of time.

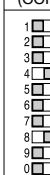
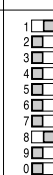
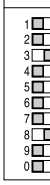
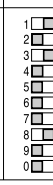
■ Setting of external trigger shutter speed

There are two ways to set the shutter speed.

Mode 1 (Non-reset mode)

*1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)
			

Mode 2 (Reset mode)

*1/100 (EIA) 1/120 (CCIR)	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	**1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: second) (Unit: second)

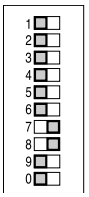
* The external trigger shutter speed is set to 1/100 sec for XC-ES50/ES30, XC-EI50/EI30 (EIA) and 1/120 sec for XC-ES50CE/ES30CE, XC-EI50CE/EI30CE (CCIR).

** The external trigger shutter speed is set to 1/10000 sec for XC-ES50/ES30, XC-EI50/EI30 (EIA) and 1/8000 sec for XC-ES50CE/ES30CE, XC-EI50CE/EI30CE (CCIR).

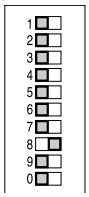
●Using trigger pulse width

– Set DIP switches 1 to 4 on the rear panel to 0.
– An arbitrary shutter speed can be obtained by setting the trigger pulse width to the range of 2 msec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)

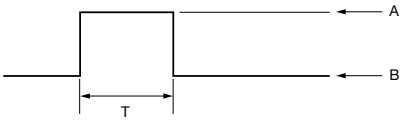


Exposure time = Trigger pulse width + 97 μsec (EIA)
120 μsec (CCIR)

Note

1. It is recommended to set DIP switch 5 for field selection. (The field selection is about two times in sensitivity as high as the frame selection.)
2. After a trigger pulse is input, a new trigger pulse must not be input before the video signal obtained by the trigger pulse has been output.

■ Specifications of trigger pulse



A: 4 to 5.0 V
B: 0 to 1.0 V
T: 2 μs to 1/4 s

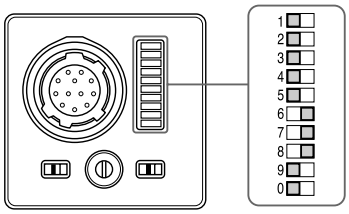
T: 2 μs to 1/4 s, 100 μs to 1/4 s when setting the shutter speed using DIP switch

* Input impedance: 10 kΩ or more

* The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

The information on one screen can be extracted at any time by inputting a restart/reset signal (HD/VD) from the outside. To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of a camera as shown in the table below. The setting is especially effective for the following operation.



B/W VIDEO CAMERA MODULE

XC-EU50/EU50CE

TV Format Output | 1/2 Type CCD | C Lens Mount | VS Output | HD VD External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter | Near-IR Sensitivity

Connection Diagram P88

Outline

The XC-EU50/EU50CE is a monochrome video camera module with a 1/2 type CCD for industrial use. With its sensitivity around the near ultraviolet range (around 365 nm), utilized the feature of the shorter wavelength range characteristics and very detailed data can be detected.
Small scratches, dust or blemishes hardly visible to the naked eye can be captured as a clear image by combining the camera with a light source that has a wavelength of about 360 nm.
This model inherited compact size, rear panel mode switches from the XC-E series and is ideal for use in industrial applications.

Features

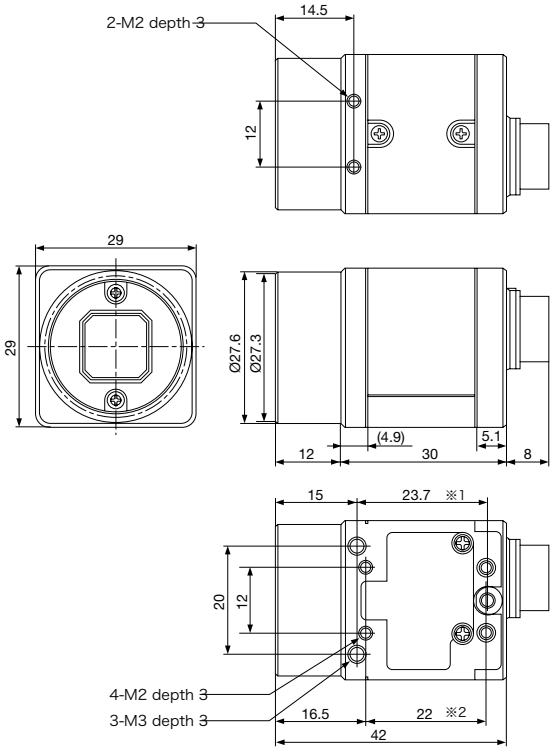
- XC-EU50/EU50CE: 1/2 type interline CCD
- Near-UV sensitivity
- High S/N ratio: 60 dB
- Electronic shutter function (1/100 to 1/10,000 sec.)
- External trigger shutter function (1/4 to 1/10,000 sec.)
- 2:1 Interlaced/non-interlaced
- Sync system: Internal/external (HD/VD)
- Frame/field accumulation
- Restart/reset function
- High shock and vibration resistance

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- Tripod adaptor
  - ●VCT-333I

Dimensions

Camera body of all XC-E models



Unit: mm

*1: M3 screw size
*2: M2 screw size

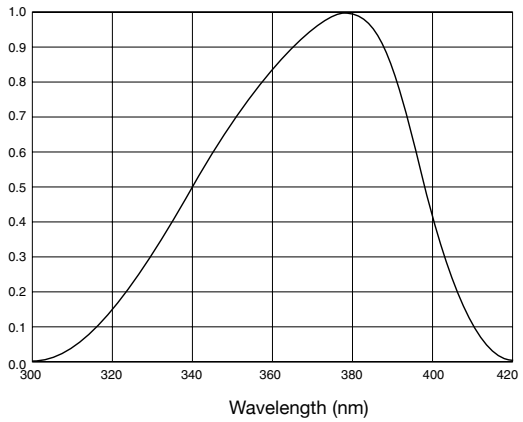
Notice

From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles.
The outside dimensions will be changed from the following serial numbers.
XC-EU50: 250001~
XC-EU50CE: 550001~

Spectral Sensitivity Characteristics

●XC-EU50/XC-EU50CE
(Typical Values)

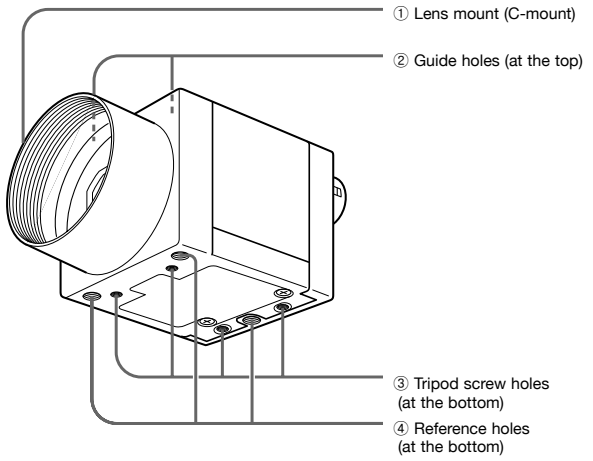
Relative sensitivity



Wavelength (nm)

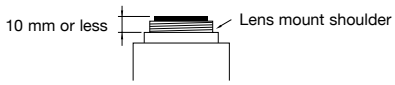
(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls



① Lens mount (C-mount)
Attach any C-mount lens or other optical equipment for Near UV.

Note
Be sure that the lens does not project more than 10 mm from the lens mount.



② Guide holes (at the top)
These screw holes help to lock the camera module.

③ Tripod screw holes (at the bottom)
These four screw holes on the bottom are for installing the camera module on a tripod. To install on a tripod, you will need to install the VCT-333I tripod adaptor using these holes on the bottom of the camera.

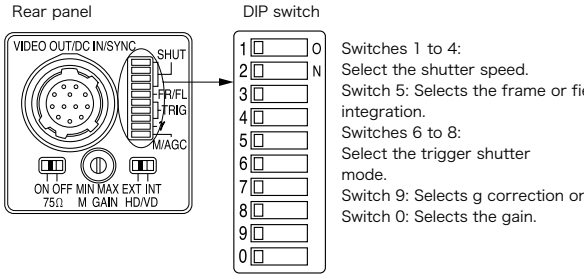
④ Reference holes (at the bottom)
These precision screw holes are for locking the camera module. Locking the camera module using these holes secures the optical axis alignment.

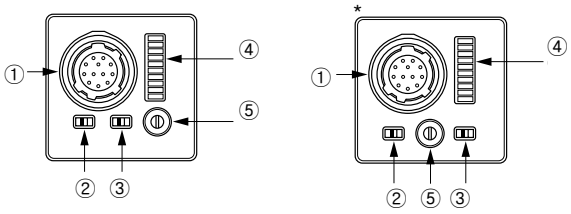
Specifications

	XC-EU50	XC-EU50CE
Image device	1/2 type IT CCD	
Signal system	EIA	CCIR
Effective picture elements	768 (H) x 494 (V)	752 (H) x 582 (V)
Effective lines	752 (H) x 485 (V)	736 (H) x 575 (V)
Cell size (µm)	8.4 (H) x 9.8 (V)	8.6 (H) x 8.3 (V)
Horizontal frequency	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz
Lens mount	C mount	
Sync system	Internal/External (auto)	
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)	
External sync frequency	±1 % (automatic switching)	
Jitter	less than ±20 nsec (external horizontal frequency)	
Scanning system	2:1 Interlaced	
Video output	1.0 Vp-p, negative, 75 Ω unbalanced	
Horizontal resolution	570 TV lines	560 TV lines
S/N ratio	60 dB	
Gain	AGC/Manual (adjustable on the rear panel)	
Gamma	ON/OFF (adjustable on the rear panel)	
Normal shutter	1/100 to 1/10,000 s	1/120 to 1/10,000 s
External trigger shutter	1/4 to 1/10,000 s	1/4 to 1/8,000 s
Power requirements	DC 12 V (+9 to16 V)	
Power consumtion	1.6 W	
Dimension (W) x (H) x (D)	29 x 29 x 30 mm	
Mass	50 g	
Operating temperature/humidity	-5 ˚C to +45 ˚C / 20 to 80 % (no condensation)	
Storage temperature/humidity	-30 ˚C to +60 ˚C / 20 to 95 % (no condensation)	
Performance guarantee temperature	0 to +40 ˚C	
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction – x,y,z)	
Shock resistance	70 G	
MTBF	126,469 hrs.	
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326	
Supplied accessories	Lens mount cap (1), Operating instructions (1)	

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.

Rear Panel





* The rear panel is different for the serial numbers shown below.
XC-EU50 :200001~
XC-EU50CE :500001~

Note

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① **12-pin multi-connector**
DC IN/HD/VD (DC power/sync signal input) VIDEO OUT terminal.

② **75Ω termination selector switch**

③ **HD/VD input-output selector switch**

④ **Shutter speed/mode setting DIP switch**

⑤ **Volume control switch**
This switch can be changed in the range of Switch 0 to 18 dB when the GAIN switch is set to “M”.
*During factory setting, this switch is adjusted to the mechanical center.

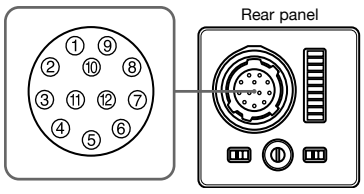
Note

When setting DIP switch 5 to the frame integration, set the volume control switch 8 to the MAX side from the mechanical center (because of CCD characteristics).

Factory Mode Settings of Rear Panel

No.	Switch	Factory-setting mode
②	75 Ω termination selector switch	ON
③	HD/VD input-output selector switch	EXT
④	Shutter speed/mode setting DIP switch	
	Switches 1 to 4: Select the shutter speed.	OFF
	Switch 5: Selects the frame or field integration.	FRAME
	Switches 6 to 8: Select the trigger shutter mode.	Normal
	Switch 9: Selects correction on/off.	OFF
	Switch 0: Selects the gain.	Manual
⑤	Volume control switch	Mechanical center

Connector Pin Assignments



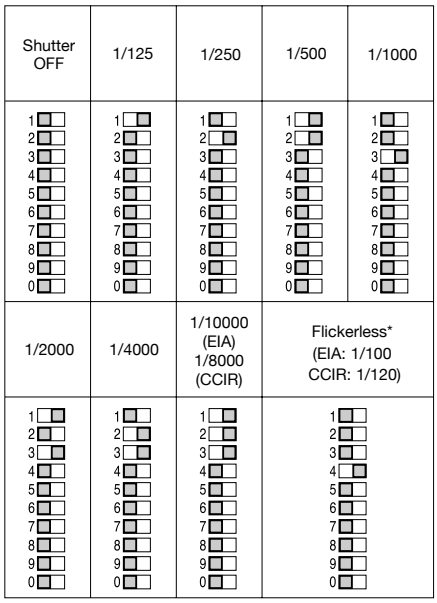
Pin No.	Camera sync output	External Sync (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	-	-	-	-
9	-	-	-	-
10	-	-	-	WEN output (Signal)
11	-	-	-	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	VD input (Signal)

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Setting of the Normal Shutter

●Using the DIP switches on the rear panel



(Unit: second)

* If you set the mode to flickerless, the positions of DIP switches 1 to 3 are optional.

Note

- The positions of DIP switches 6 and 7 are optional.
- The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

External Trigger Shutter

By inputting an external trigger pulse, the camera is able to capture fast-moving objects clearly.
Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2 (See the table below).
When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.
There are two modes for timing in which a video signal is obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

– A video signal is synchronized with the external VD signal when an external HD/VD signal is input.
– A video signal is synchronized with an internal VD signal when no external HD/VD signal is input.

●Mode 2 (Reset mode)

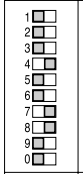
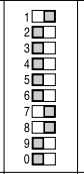
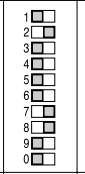
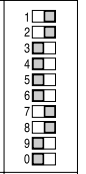
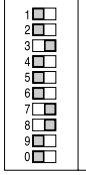
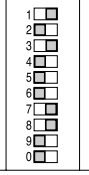
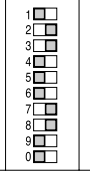
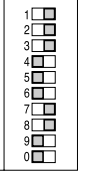
In this mode, an internal VD is reset, then an internal video signal is output after trigger pulse input after a certain period of time.

Setting of the External Trigger Shutter

You can set the shutter speed with the DIP switches or using the trigger pulse width.

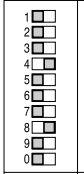
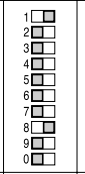
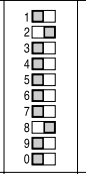
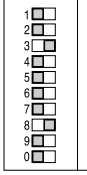
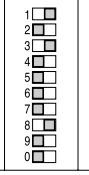
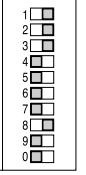
●Using the DIP switches on the rear panel

Mode 1 (Non-reset mode)

1/100 (EIA)* 1/120 (CCIR)*	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: second)

Mode 2 (Reset mode)

1/100 (EIA)* 1/120 (CCIR)*	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)
			

(Unit: second)

* If 1/100 (EIA) or 1/120 (CCIR) has been set, the positions of DIP switches 1 to 3 are optional.

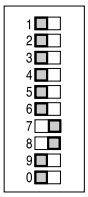
Note

The positions of DIP switches 5, 9 and 0 are optional.

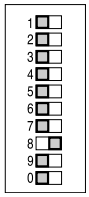
●Setting the external shutter speed with the trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to 0.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 µsec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)

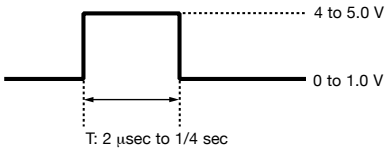


Exposure time = Trigger pulse width + 97 µsec (EIA)
Trigger pulse width + 120 µsec (CCIR)

Note

- The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.
- If you input a new trigger pulse before the video signal output for the previous trigger pulse is output completely, an incorrect video signal will be output.

●Specifications of the Trigger Pulse



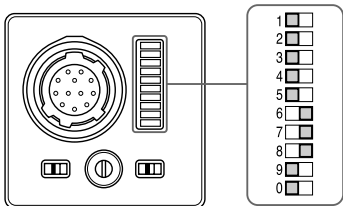
T: If you set the trigger pulse with the DIP switches, use the 100 µs to 1/4 sec pulse width.

- Input impedance; 10 kΩ or more.
- The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

To set Restart/Reset mode

The information on one screen can be extracted at any time by externally inputting a restart/reset signal (HD/VD). To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of the camera as shown in the figure below. The setting is especially effective for the operation explained below.



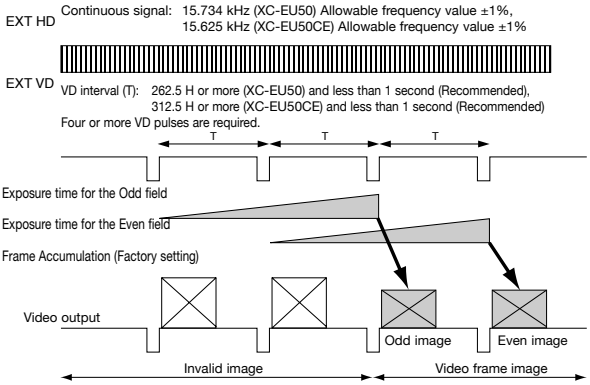
Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in a highly sensitive image. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe a moving object. Extend the VD interval (T) period between external VD pulses.

Note

Some white spots may appear after a long exposure.

Sample input timing chart 1

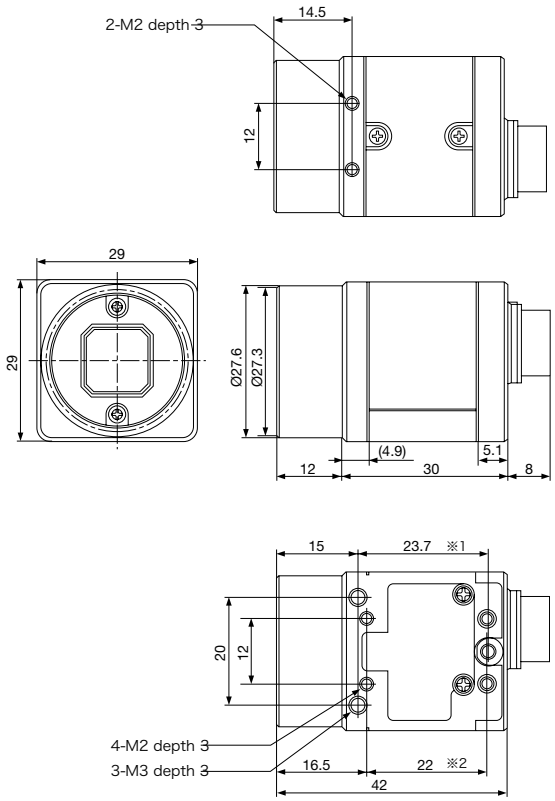

EXT HD
Continuous signal: 15.734 kHz (XC-EU50) Allowable frequency value ±1%,
15.625 kHz (XC-EU50CE) Allowable frequency value ±1%
EXT VD
VD interval (T): 262.5 H or more (XC-EU50) and less than 1 second (Recommended),
312.5 H or more (XC-EU50CE) and less than 1 second (Recommended)
Four or more VD pulses are required.
T
T
T
Exposure time for the Odd field
Exposure time for the Even field
Frame Accumulation (Factory setting)
Video output
Odd image
Even image
Invalid image
Video frame image

Odd and even fields are determined by the phase of the EXT HD/VD signal input from the outside.

Information of XC-E Series Console Modification

From January 2005, the outside dimensions of XC-E series consoles will be changed to the same dimensions of XC-HR series consoles.

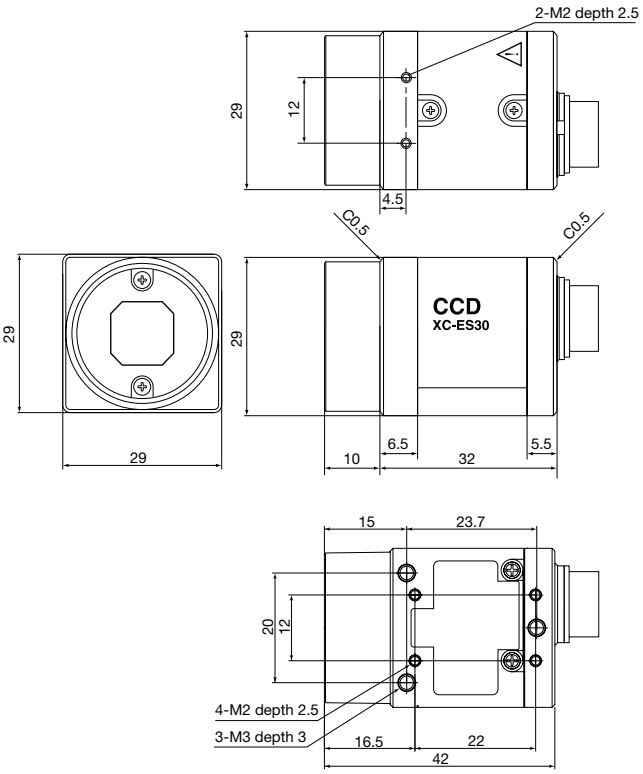
New Dimensions



Unit: mm

*1: M3 screw size
*2: M2 screw size

Old Dimensions



Unit: mm

The outside dimensions will be changed from the following serial number.

XC-ES50/ES30 : 250001~
XC-ES50CE/ES30CE : 550001~
XC-ES51 : 150001~
XC-ES51CE : 450001~
XC-EI50/EI30 : 250001~
XC-EI50CE/EI30CE : 550001~
XC-EU50 : 250001~
XC-EU50CE : 550001~

B/W VIDEO CAMERA MODULE

XC-ES50L/ES50LCE

TV Format Output | 1/2 Type CCD | C Lens Mount | VS Output | HD VD External Sync | Restart Reset | Long Exposure | Normal Shutter | Mode 1 (Non-Reset Mode) External Trigger Shutter | Mode 2 (Non-Reset Mode) External Trigger Shutter | L Type

Connection Diagram P89

Outline

The XC-ES50L/ES50LCE is a monochrome video camera module with a 1/2 type CCD for industrial use.
Like the XC-ES50/ES50CE, this model provides various mode switches on the rear panel, making it ideal for use in combination with other industrial equipment.

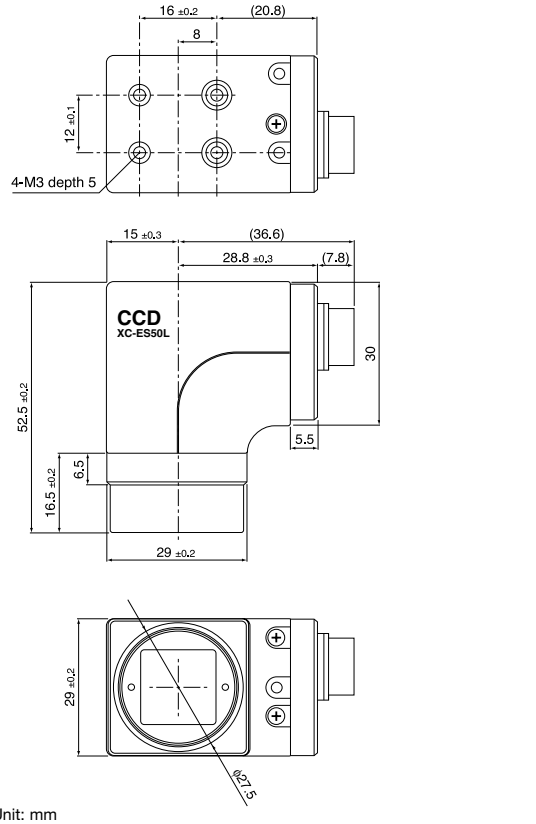
Features

- XC-ES50L/ES50LCE: 1/2 type interline CCD
- High S/N ratio: 60 dB
- Electronic shutter function (1/100 to 1/10,000 sec.)
- External trigger shutter function (1/4 to 1/10,000 sec.)
- 2:1 Interlaced/non-interlaced
- Frame/field accumulation
- Restart/reset function
- IR cut filter
- Sync system: Internal/external (HD/VD)
- High shock and vibration resistance

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)

Dimensions

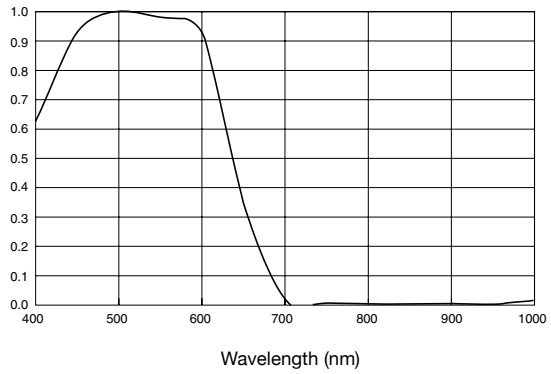


Unit: mm

Spectral Sensitivity Characteristics

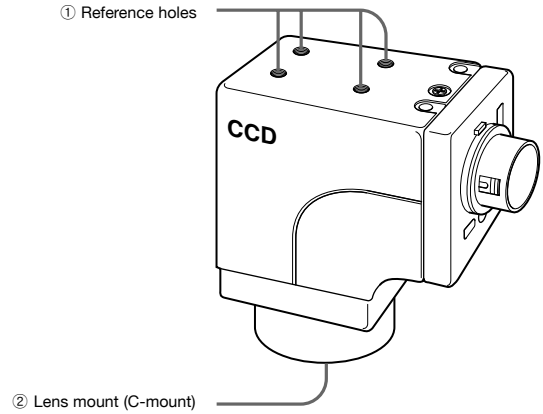
●XC-ES50L/XC-ES50LCE
(Typical Values)

Relative sensitivity



(Lens characteristics and light source characteristics excluded.)

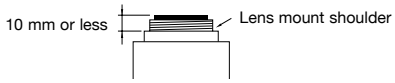
Location and Function of Parts and Controls



① Reference holes
These precision screw holes are for locking the camera module.

② Lens mount (C-mount)
Attach any C-mount lens or other optical equipment.

Note
The lens must not project more than 10 mm from the lens mount.

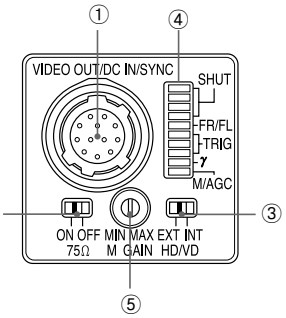


Specifications

	XC-ES50L	XC-ES50LCE
Image device	1/2 type IT CCD	
Signal system	EIA	CCIR
Effective picture elements	768 (H) x 494 (V)	752 (H) x 582 (V)
Effective lines	752 (H) x 485 (V)	736 (H) x 575 (V)
Cell size (µm)	8.4 (H) x 9.8 (V)	8.6 (H) x 8.3 (V)
Horizontal frequency	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz
Lens mount	C mount	
Sync system	Internal/External (auto)	
External sync system input/output*1	HD/VD (HD/VD level: 2 to 5 Vp-p)	
External sync frequency	±1 % (in horizontal sync frequency)	
H Jitter	less than ±20 nsec	
Scanning system	525 lines 2:1 Interlaced (Automatic switching according to input signal)	625 lines 2:1 Interlaced (Automatic switching according to input signal)
Video output	1.0 Vp-p, negative, 75 Ω unbalanced	
Horizontal resolution	570 TV lines	560 TV lines
Sensitivity	400 lx F4 (γ=ON, MIN GAIN, IR cut filter)	
Minimum illumination	3.0 lx	
S/N ratio	60 dB	
Gain	AGC/Manual (adjustable on the rear panel)	
Gamma	ON/OFF (adjustable on the rear panel)	
Normal shutter	1/100 to 1/10,000 s	1/120 to 1/10,000 s
External trigger shutter*2	1/4 to 1/10,000 s	1/4 to 1/8,000 s
Power requirements	DC 12 V (+9 to16 V)	
Power consumtion	1.6 W	
Dimension (W) x (H) x (D)	29 x 42.5 x 43.8 mm	
Mass	110 g	
Operating temperature/humidity	-5 ˚C to +45 ˚C / 20 to 80 % (no condensation)	
Storage temperature/humidity	-20 ˚C to +60 ˚C / 20 to 95 % (no condensation)	
Performance guarantee temperature	0 to +40 ˚C	
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction – x,y,z)	
Shock resistance	70 G	
MTBF	126,469 hrs.	
Regulatory compliance	UL1492, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326	
Supplied accessories	Lens mount cap (1), Operating instructions (1)	

*1 Automatic switching in response to the presence of an input signal when the switch on the rear panel is set to EXT.
*2 Using Dip switch on the rear panel or Using trigger pulse width

Rear Panel



Note

Be sure to turn the power off before making switch settings. As the variable controller for manual adjustment is a small precise component, do not apply force more than required when adjusting. Doing so will break the component. The controller is not a 360-degree rotation type. Do not turn the controller beyond the stopper of the component. The range of rotation is about 260 degrees. For the adjustment of the variable controller, use a flathead screwdriver. The sizes of a recommended flathead screwdrivers are 1.9mm width, 0.5mm thickness and more than 0.45mm length.

① **Video out/DC IN/SYNC (video output/DC power input/ sync signal I/O) connector (12-pin)**
Connect a CCXC-12P05N camera cable to this connector for the +12V DC power supply and the video signal output from the camera module. When a sync signal generator is connected to this connector, the camera module is synchronized with the external sync signals (HD/VD signals).

② **75Ω termination switch**
Turn this to OFF when not terminated. (Factory setting: ON)

③ **HD/VD signal input/output switch**
Set the switch to INT to output HD/VD signals from the camera module.Set the switch to EXT to input HD/VD signals from an external unit. (Factory setting: EXT)

④ **Shutter speed/Mode setting DIP switch**

Shutter speed (bits 1 to 4)
Set an appropriate shutter speed. (Factory setting: OFF)

Potential accumulation mode (bit 5):
(Factory setting: FRAME)

Restart reset/External trigger shutter mode switch (bits 6–8):
(Factory setting: Normal)

γ compensation ON/OFF switch (bit 9):
Turn on this switch to enable the g compensation.
(Factory setting: OFF)

GAIN switch (bit 0):
This switch selects MGC (manual adjustment) or AGC (automatic adjustment). (Factory setting: MGC)

⑤ **Manual GAIN (M GAIN) control knob**
If you have selected MGC with the GAIN switch (DIP switch②), this knob adjusts the gain. (Factory setting: twelve o'clock position)

Note

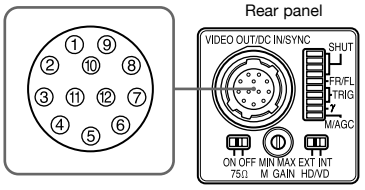
If you have selected FRAME using the Potential accumulation mode (DIP switch ②), set this knob to MAX.
(This is due to requirement CCD.)

Factory Mode Settings of Rear Panel

No.	Switch	Factory-setting mode
②	75 Ω termination selector switch	ON
③	HD/VD input-output selector switch	EXT
④	Shutter speed/mode setting DIP switch	
	Switches 1 to 4: Select the shutter speed.	OFF
	Switch 5: Selects the frame or field integration.	FRAME
	Switches 6 to 8: Select the trigger shutter mode.	Normal
	Switch 9: Selects correction on/off.	OFF
	Switch 0: Selects the gain.	Manual
⑤	Volume control switch	Mechanical center

* When the GAIN switch is set to "MGC" (Manual), you can change the gain level in a range from 0 to 18 dB.

Connector Pin Assignments



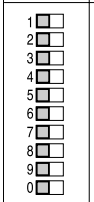
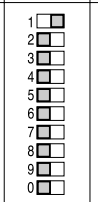
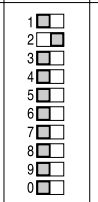
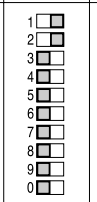
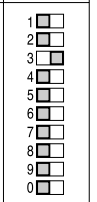
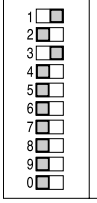
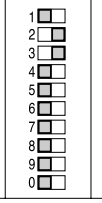
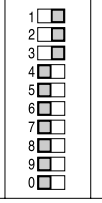
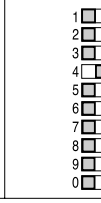
Pin No.	Camera sync output	External mode (HD/VD)	Restart/Reset	External trigger shutter
1	Ground	Ground	Ground	Ground
2	+12V DC	+12V DC	+12V DC	+12V DC
3	Video output (Ground)	Video output (Ground)	Video output (Ground)	Video output (Ground)
4	Video output (Signal)	Video output (Signal)	Video output (Signal)	Video output (Signal)
5	HD output (Ground)	HD input (Ground)	HD input (Ground)	HD input (Ground)
6	HD output (Signal)	HD input (Signal)	HD input (Signal)	HD input (Signal)
7	VD output (Signal)	VD input (Signal)	Reset (Signal)	VD input (Signal)
8	-	-	-	-
9	-	-	-	-
10	-	-	-	WEN output (Signal)
11	-	-	-	Trigger pulse input (Signal)
12	VD output (Ground)	VD input (Ground)	Reset (Ground)	Reset (Ground)

Normal Shutter

This mode provides continuous video output with the electronic shutter selected by switches to capture a high-speed moving object clearly.

Setting of the Normal Shutter

●Using the DIP switches on the rear panel

Shutter OFF	1/125	1/250	1/500	1/1000
				
1/2000	1/4000	1/10000	Flickerless* (EIA: 1/100 CCIR: 1/120)	
				

(Unit: second)

* If you set the mode to flickerless, the positions of DIP switches 1 to 3 are optional.

Note

- The positions of DIP switches 6 and 7 are optional.
- The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.

External Trigger Shutter

By inputting an external trigger pulse, the camera is able to capture fast-moving objects clearly.
Set DIP switches 6, 7, and 8 on the rear panel to Mode 1 or Mode 2 (See the table below).
When you set the trigger pulse width to 1/3 of a second or more, the output signal changes to the normal VIDEO signal.
There are two modes for timing in which a video signal is obtained.

●Mode 1 (Non-reset mode)

In this mode, a video signal synchronized with a VD signal is output after a trigger pulse is input.

– A video signal is synchronized with the external VD signal when an external HD/VD signal is input.
– A video signal is synchronized with an internal VD signal when no external HD/VD signal is input.

●Mode 2 (Reset mode)

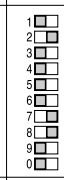
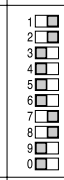
In this mode, an internal VD is reset, then an internal video signal is output after trigger pulse input after a certain period of time.

Setting of the External Trigger Shutter

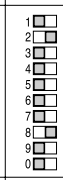
You can set the shutter speed with the DIP switches or using the trigger pulse width.

●Using the DIP switches on the rear panel

Mode 1 (Non-reset mode)

1/100 (EIA)* 1/120 (CCIR)*	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)

Mode 2 (Reset mode)

1/100 (EIA)* 1/120 (CCIR)*	1/125	1/250	1/500
			
1/1000	1/2000	1/4000	1/10000 (EIA) 1/8000 (CCIR)

(Unit: second) (Unit: second)

* If 1/100 (EIA) or 1/120 (CCIR) has been set, the positions of DIP switches 1 to 3 are optional.

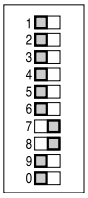
Note

The positions of DIP switches 5, 9 and 0 are optional.

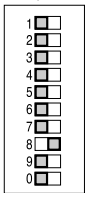
●Setting the external shutter speed with the trigger pulse width

Set all DIP switches (1 to 4 on the rear panel) to 0.
You can obtain an arbitrary shutter speed by setting the trigger pulse width to the range of 2 μsec to 250 msec.

Mode 1 (Non-reset mode)



Mode 2 (Reset mode)

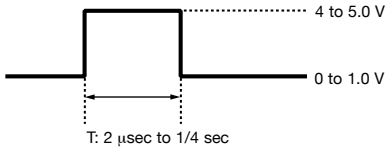


Exposure time = Trigger pulse width + 97 μsec (EIA)
Trigger pulse width + 120 μsec (CCIR)

Note

- The DIP switch 5 position is optional. (The field setting is recommended.) The field setting can obtain a sensitivity that is twice that of the frame setting.
- An image is not output correctly when the next trigger is input before the image for the previous trigger is output.

●Specifications of the Trigger Pulse



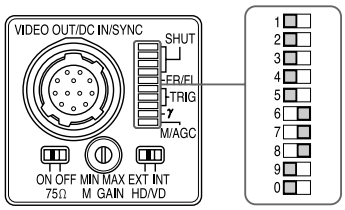
T: If you set the trigger pulse with the DIP switches, use the 100 μs to 1/4 sec pulse width.

- Input impedance; 10 kΩ or more.
- The voltage and pulse width used are measured at pin 11 of a 12-pin multi-connector on the rear panel.

Restart/Reset

To set Restart/Reset mode

The information on one screen can be extracted at any time by externally inputting a restart/reset signal (HD/VD). To enter this mode, set DIP switches 6, 7, and 8 on the rear panel of the camera as shown in the figure below. The setting is especially effective for the operation explained below.



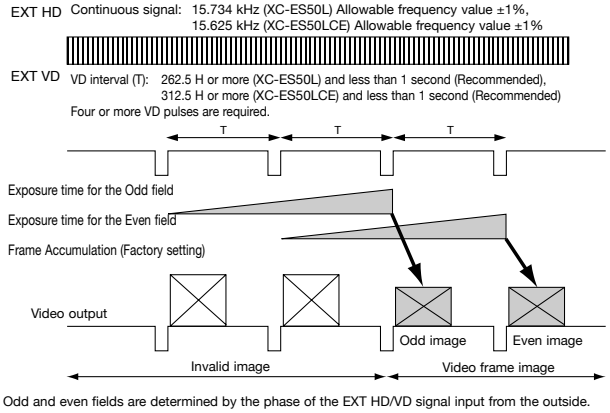
Long Exposure

The Restart/Reset function extends the CCD accumulation time, resulting in a highly sensitive image. This function is effective when you cannot gain satisfactory sensitivity under normal operating conditions, or when you want to observe a moving object. Extend the VD interval (T) period between external VD pulses.

Note

Some white spots may appear after a long exposure.

Sample input timing chart 1


EXT HD
Continuous signal: 15.734 kHz (XC-ES50L) Allowable frequency value ±1%,
15.625 kHz (XC-ES50LCE) Allowable frequency value ±1%
EXT VD
VD interval (T): 262.5 H or more (XC-ES50L) and less than 1 second (Recommended),
312.5 H or more (XC-ES50LCE) and less than 1 second (Recommended)
Four or more VD pulses are required.
T
T
T
Exposure time for the Odd field
Exposure time for the Even field
Frame Accumulation (Factory setting)
Video output
Odd image
Even image
Invalid image
Video frame image

Odd and even fields are determined by the phase of the EXT HD/VD signal input from the outside.

Colour VIDEO CAMERA MODULE

XC-555/555P

TV Format Output | 1/2 Type CCD | NF Lens Mount | VBS Output | Y/C Output | HD VD External Sync | Normal Shutter
CCD Iris | ATW White Balance | Fixed White Balance | Manual White Balance | RS232C Control

NF

Connection Diagram P89

Outline

The XC-555/555P is an ultra-compact, integrated 1/2 type IT CCD Colour camera ideally suited for a wide variety of applications such as machine vision, multimedia and remote monitoring. The XC-555/555P is designed so that a video output signal can be obtained by only providing a power supply of 12 V DC. Its ultra-compact, one-piece design eliminates the need for a bulky CCU (Camera Control Unit), allowing the XC-555/555P cameras to be easily installed in space-restricted areas. In addition, the XC-555/555P cameras use a unique, compact NF mount lens system that can be converted into a flexible C mount lens.

Features

- 1/2 type IT CCD
- Ultra-compact and light-weight:
  22 (H) x 22 (W) x 75 (D) mm, 60g
- One piece camera - no bulky CCU
- Compact NF lens and lens mount
- CCD IRIS function
- VBS and Y/C outputs
- External synchronization
- RS-232C interface to control camera functions*1

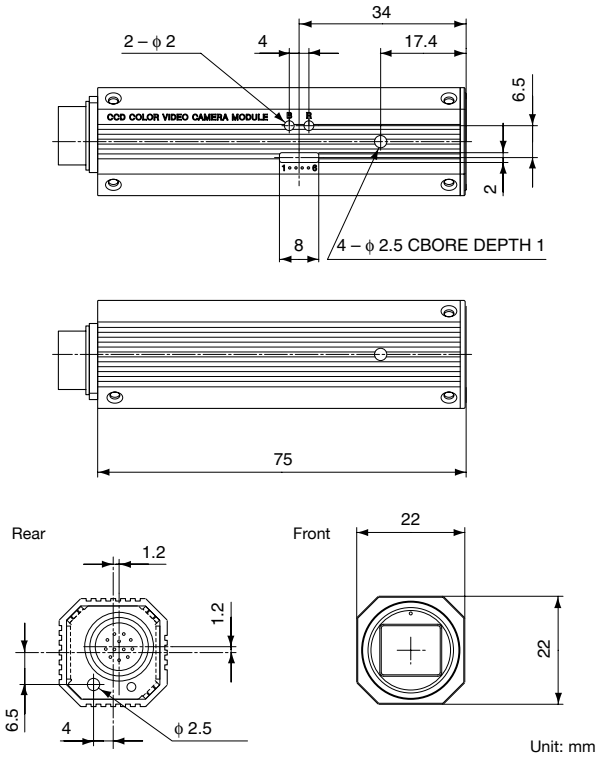
*1 The RS-232C switch is set to OFF at the factory. For details on how to change this setting. please refer to the Technical Manual.

Accessories

- Compact camera adaptor
  - ●DC-700/700CE
- 12-pin camera cable (CE standard)
  - ●CCXC-12P02N (2 m)
  - ●CCXC-12P05N (5 m)
  - ●CCXC-12P10N (10 m)
  - ●CCXC-12P25N (25 m)
- NF-mount LENS
  - ●VCL-03S12XM
  - ●VCL-06S12XM
  - ●VCL-12S12XM
- C-mount adaptor
  - ●LO-999CMT

* When a C-mount type lens is attached, a C-mount adaptor is required.

Dimensions

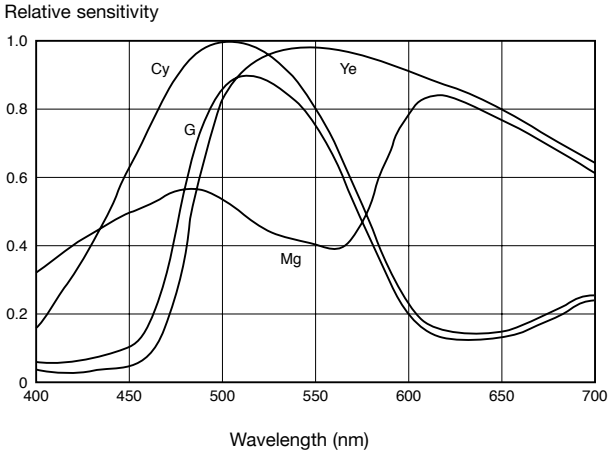


Unit: mm

Spectral Sensitivity Characteristics

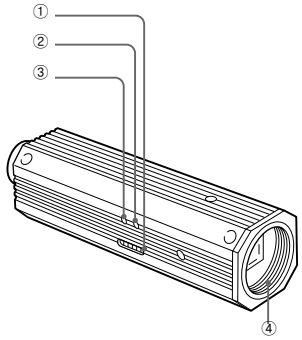
●XC-555

(Typical Values)



(Lens characteristics and light source characteristics excluded.)

Location and Function of Parts and Controls

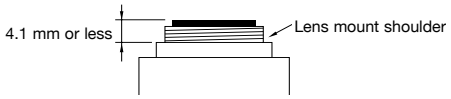


① **Dip switches for setting functions**
This switches are used to adjust white balance and shutter speed; and to flip AGC (ON/OFF) and output signals (Y/C/VBS).

② **R control for manual white balance adjustment**
This control is effective when the white balance switches are set to MAN. Adjust the red Colour by turning the control.

③ **B control for manual white balance adjustment**
This control is effective when the white balance switches are set to MAN. Adjust the blue Colour by turning the control.

④ **Lens mount (special mount)**



Note

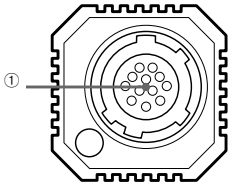
- To attach a C-mount type lens, a C-mount adaptor (LO- 999CMT) is required.
- This camera uses a 1/2-inch CCD. So the lens should be used with this size of CCD. If used with a lens intended for a 2/3-inch CCD, the angle of view will be different.
- When connecting a heavy lens, make sure that it is supported properly.
- When connecting heavy lens, make sure that it is not subject to shocks or vibration.

Specifications

	XC-555	XC-555P
Image device	1/2 type IT CCD	
Signal system	NTSC	PAL
Effective picture elements	768 (H) x 494 (V)	752 (H) x 582 (V)
Effective lines	756 (H) x 485 (V)	739 (H) x 575 (V)
Cell size	8.4 μm (H) x 9.8 μm (V)	8.6 μm (H) x 9.3 μm (V)
Lens mount	NF mount (Flange back 12 mm)	
Sync system	Internal/External (auto)	
External sync system input/output	HD/VD (HD/VD level: 2 to 4 Vp-p), 75 Ω VS (1 Vp-p), 75 Ω	
External sync frequency	VD/59.94 Hz ± 0.0009 Hz	VD/50 Hz ± 0.00075 Hz
	HD/15734 Hz ± 0.016 Hz	HD/15625 Hz ± 0.0156 Hz
Scanning system	525 lines 2:1 Interlaced 30fps	625 lines 2:1 Interlaced 25fps
Colour filter	Complementary Colour mosaic	
Video output	VBS, Y/C (selected with the switch), VBS: 1 Vp-p, 75 Ω, sync negative, Y: 1 Vp-p, 75 Ω	
	C: C level depends on the composite video out signal	
Horizontal frequency	15.734 kHz	15.625 kHz
Vertical frequency	59.94 Hz	50 Hz
Horizontal resolution	470 TV lines	460 TV lines
Vertical resolution	485 TV lines	575 TV lines
Sensitivity	2000 lx F8 (γ=ON, MIN GAIN, AGC OFF (0 dB))	
Minimum illumination*	3.0 lx (F1.2, AGC ON (18 dB))	
S/N ratio	48 dB (AGC OFF (0 dB))	46 dB (AGC OFF (0 dB))
White balance	ATW, 3200 K, 5600 K, MANUAL	
Gain	AGC (0 to 18 dB)/FIX (0 dB)	
Gamma	ON/OFF Controlled by RS-232C *1	
Shutter speed	OFF, Flickerless, 1/1000 s, CCD IRIS	
CCD IRIS	Auto: 1/60 to 1/4000 s RS-232C: 1/60 to 1/100 000 s *1	Auto: 1/50 to 1/4000 s RS-232C: 1/50 to 1/100 000 s *1
Output connector	DC IN, SYNC, VIDEO: multi 12-pin	
Power requirements	DC +10.5 to +15 V	
Power consumtion	2.4 W	
Dimension (W) x (H) x (D)	22 x 22 x 75 mm	
Mass	60 g	
Operating temperature	0 to +40 °C	
Storage temperature	-30 to +60 °C	
Performance guarantee temperature	0 to +40 °C	
Operating humidity	20 to 80 % (no condensation)	
Storage humidity	20 to 90 % (no condensation)	
Vibration resistance	10 G (20 to 200 Hz 20 minutes for each direction – x,y,z)	
Shock resistance	70 G	
MTBF	70,900 Hrs	
Regulatory compliance	UL6500, FCC/ICES-003 : ClassB, CE : EN61326, AS/NZ : EN61326	
Supplied accessories	Lens mount cap (1), Tripod adaptor (1 set), Operating Instructions (1)	

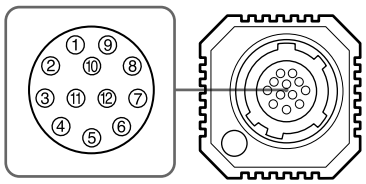
*1 The RS-232C switch is set to OFF at the factory. For details on how to change this setting. please refer to the Technical Manual.

Rear Panel



① **DC IN/SYNC/VIDEO connector (multi 12-pin)**
This connector inputs DC 12V power and outputs the video signal when the CCXC-12P02N/12P05N/12P10N/12P25N camera cable is connected.
If the unit is connected to devices that originate a synchronized signal, the external synchronous signal (VS, HD/VD) can be used to move the Colour camera module.

Connector Pin Assignments



Signal / Pin No.	Sync signal types		
	External Sync signal		Internal Sync signal
	HD,VD	VS Input	
1	Ground (Earth)	Ground (Earth)	Ground (Earth)
2	+12V	+12V	+12V
3	VBS/Y Output (Earth)	VBS/Y Output (Earth)	VBS/Y Output (Earth)
4	VBS/Y Output (signal)	VBS/Y Output (signal)	VBS/Y Output (signal)
5	HD Input (Earth)	–	–
6	HD Input (signal)	–	–
7	VD Input (signal)	VS Input (signal)	–
8	Ground (–/C)	Ground (–/C)	Ground (–/C)
9	–/C Output (signal)	–/C Output (signal)	–/C Output (signal)
10	RS-232C (TXD) *		
11	RS-232C (RXD) *		
12	VD Input (Earth)	VS Input (Earth)	Ground
	RS-232C (Earth)		

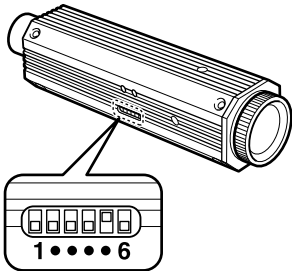
* **RS-232C setting**
Changing the setting of the RS-232C switch falls under the heading of dismantling the camera, and is outside the scope of the warranty.
To change the setting, request assistance from the dealer from whom you purchased your camera.

Mode Setting

By flipping the DIP switches located on the side of this camera, you can adjust the following functions.

Note

Each switch is assigned to a function. The switches that should be set to adjust a certain function (white balance, shutter speed), to switch the AGC (ON/OFF), or to switch the output signals (Y/C/VBS) are specified and indicated by shading in the illustrations of the corresponding descriptions of the function. The switches that are not shaded are not related to these functions.



■ To Adjust the white balance

Select the white balance setting according to the lighting conditions.

	Lighting condition	DIP switch setting
3200K (fixed)	For indoor shooting under incandescent light (factory setting).	1 · · · · 6
5600K (fixed)	For outdoor shooting on sunny days.	1 · · · · 6
ATW (auto tracing white balance)	The white balance is adjusted according to the Colour temperature transition of the subject. This mode is suitable for shooting with variable lighting.	1 · · · · 6
MAN (manual)	Select this position when you want to adjust the red Colour with the R control and the blue Colour with the B control.	1 · · · · 6

To adjust the white balance, use the shaded switches.

■ To adjust the shutter speed

Set the shutter speed switches to select the desired shutter speed.
Using the CCD IRIS function, set the CCD IRIS mode.

	Shutter speed	DIP switch setting
OFF	(XC-555) 1/60 sec. (factory setting) (XC-555P) 1/50 sec. (factory setting)	
1/1000	1/1000 sec.	
CCD IRIS	Set the CCD IRIS mode.	
FLICKERLESS	1/100 sec. (XC-555) 1/120 sec. (XC-555P)	

To adjust the shutter speed, use the shaded switches.

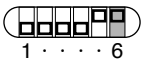
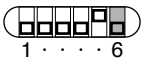
■ AGC (Auto Gain Control) ON/OFF

	Gain	DIP switch setting
ON	Auto gain control (factory setting)	
OFF	0 dB	

To switch the AGC on or off, use the shaded switches.

■ Y/C/VBS

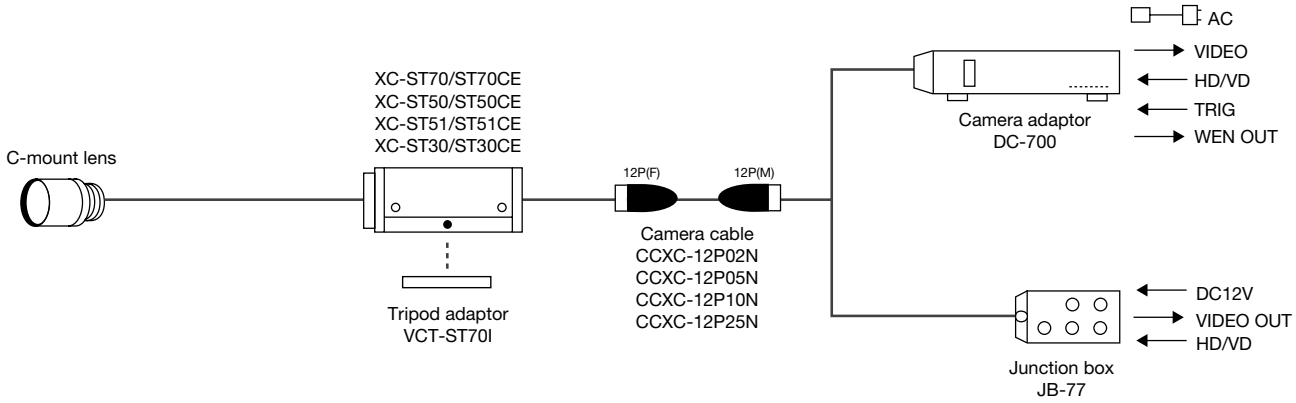
Select the camera output signal.

	Output signal	DIP switch setting
Y/C	Select this position to output the Y/C separated signal from the DC IN/VIDEO connector.	
VBS	Select this position to output the VBS signal from the DC IN/VIDEO (factory setting).	

To switch the output signals (Y/C/VBS), use the shaded switches.

Connection Diagram

XC-ST Series



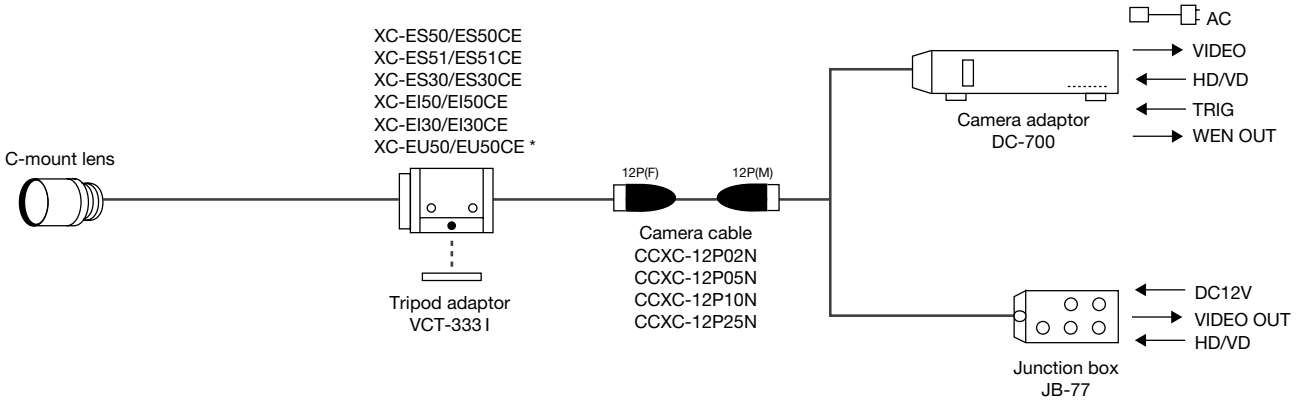
Note

When using the JB-77, not all of the XC-ST series functions can be used. See the table on the right.

○ : Usable × : Not usable

XC-ST Series	JB-77
Normal	○
Normal shutter	○
Restart/reset (R/R)	○
External trigger shutter	×
WEN OUT	×

XC-E Series



*Recomended lens for XC-EU/EU50CE : Near UV Lens

Note

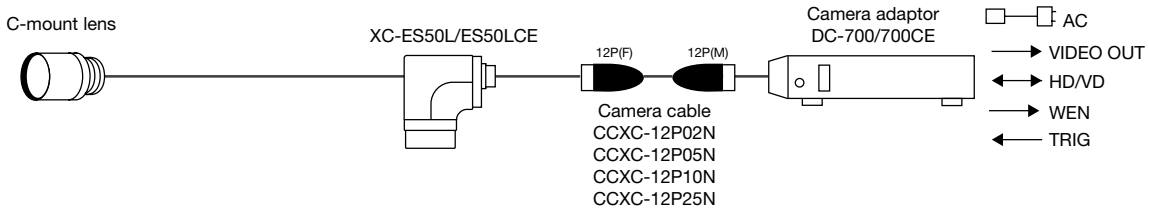
When using the JB-77, not all of the XC-E series functions can be used. See the table on the right.

○ : Usable × : Not usable

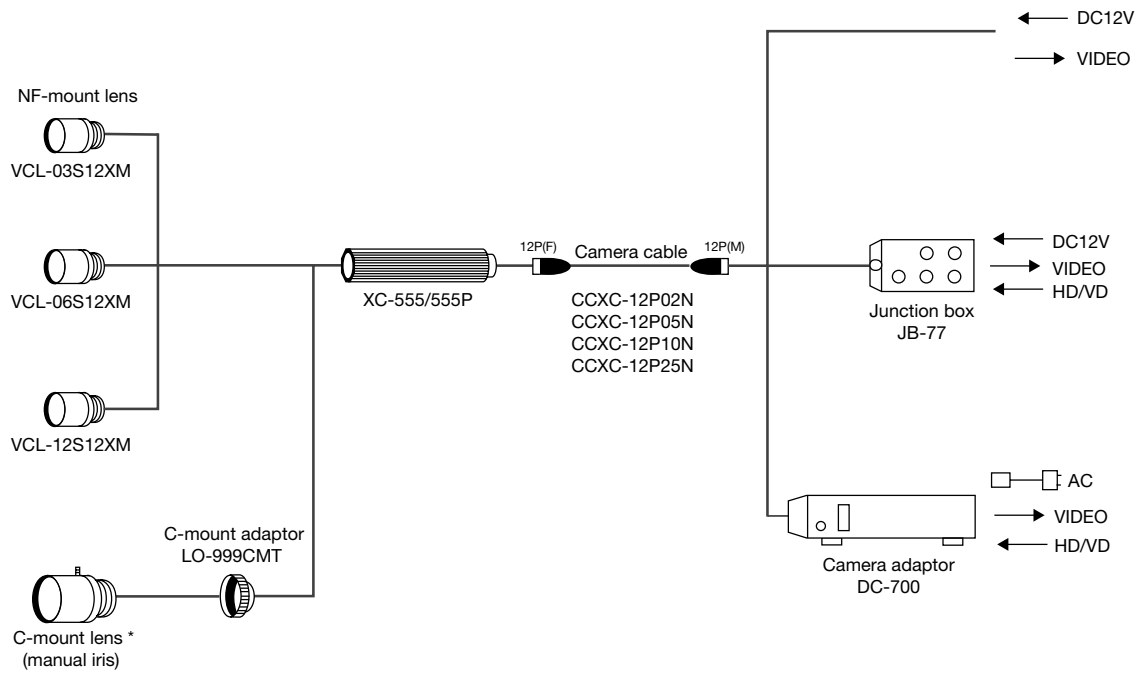
XC-E Series	JB-77
Normal	○
Normal shutter	○
Restart/reset (R/R)	○
External trigger shutter	×
WEN OUT	×

Connection Diagram

XC-ES50L/XC-ES50LCE



XC-555/555P



* To use the C-mount lens, Screw the C-mount adaptor into the lens mount of the camera.

CAMERA ADAPTOR

DC-700/700CE

Outline

The DC-700/700CE is a compact, lightweight camera adaptor for XC series cameras. In line with the size reduction of XC series cameras, it is smaller and lighter than the conventional power adaptors (DC77RR and DC-777). It is compatible with all of the XC series cameras and accessories, includes VIDEO OUT 2, TRIG IN, and WEN OUT connections.

Features

- Compact, lightweight
- External sync input/output
- Trigger input/WEN output
- Built-in high-performance switching power supply

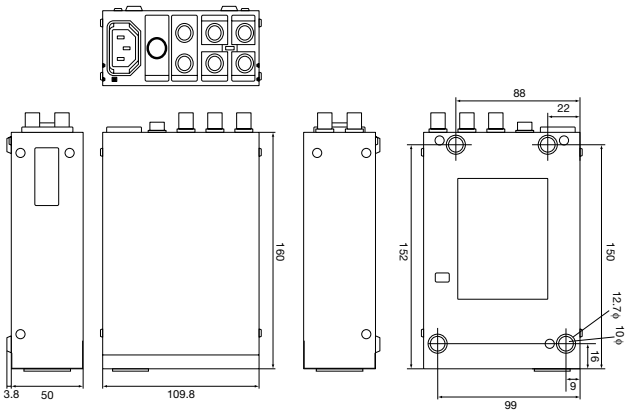
Specifications

	DC-700 (J)	DC-700 (UC)	DC-700CE
Region	Japan	USA	Europe
Signal system	EIA/NTSC	EIA/NTSC	CCIR/PAL
Power requirements	AC 100 V	AC 100 to 120 V	AC 100 to 240 V
Voltage	50/60 Hz		
Output voltage	DC 13 V 1.3A		
Power consumption	34 VA	22 W	22 W
Operating temperature/ humidity	0 to 40 °C/10 to 90% (no condensation)		
Storage temperature/ humidity	-20 to 60 °C/10 to 90% (no condensation)		
Input terminals	WEN terminal BNC type (1) TRIG terminal BNC type (1) HD terminal BNC type (1) VD/SYNC terminal BNC type (1) VIDEO1 terminal BNC type (1) VIDEO2 terminal BNC type (1) CAMERA terminal 12-pin (1)		
Mass	700 g		
Dimensions (mm)	110 (W) x 53 (H) x 160 (D)		
Supplied accessories	Power cord (1), Operating instructions (1), AC plug adaptor (1) (Included with DC-700(J))		
Regulatory compliance	Electrical Appliance and Material Safety Law	UL1310-1+CSAC22.2 No.223, FCC/ICES-003: ClassA	FCC Class A, CE: EN61326 & EN60065, AS/NZ: EN61326, Demko: EN60065

Note

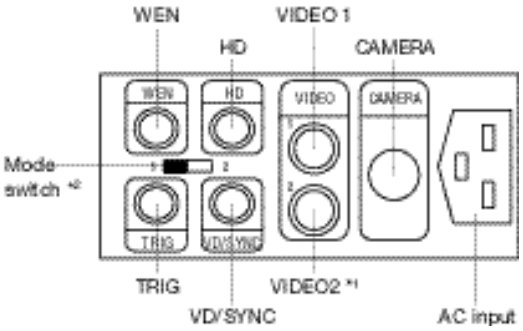
The above products comply safety standards for each district. Select the product suitable to the district to use.

Dimensions



Unit: mm

Rear Panel

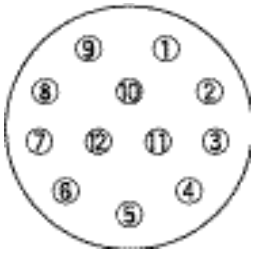


*1 Two video outputs may not be available for some types of cameras. This becomes TRIG input terminal when using XC-55, XC-55BB, XC-56, XC-56BB.

*2 Set the switch to 2 only when using XC-999.

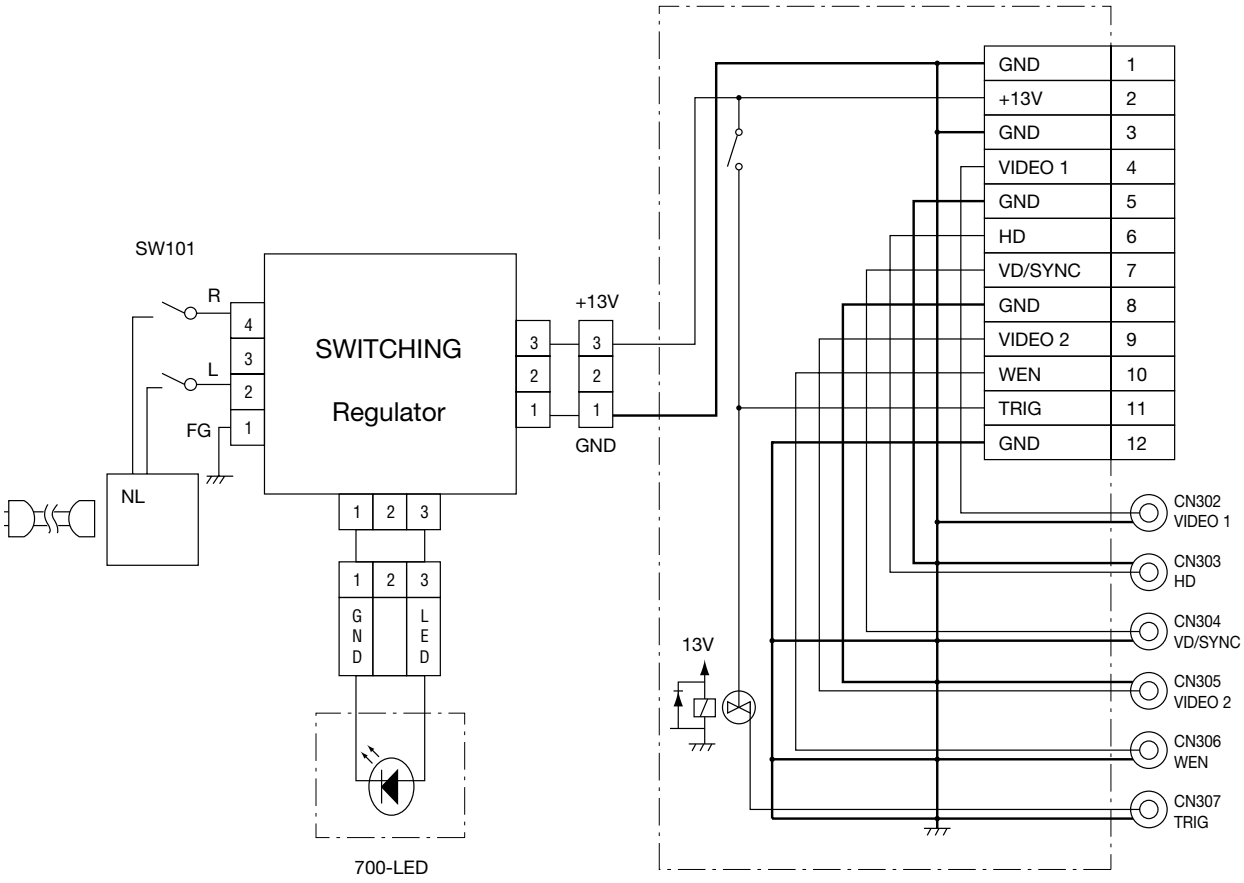
Connector Pin Assignments

Pin No.	
1	GND
2	+13V
3	GND
4	VIDEO 1
5	GND
6	HD
7	VD/SYNC
8	GND
9	VIDEO 2 *
10	WEN
11	TRIG
12	GND



* This becomes TRIG input terminal when using XC-55, XC-55BB, XC-56, XC-56BB.

Block Diagram



Comparative Tables

Comparison with DC-77RR and DC777 Camera Adaptors

	DC-700	DC-77RR	DC-777
Video output	2 video outputs *1	2 video outputs *2 (both identical)	1 video output
S-video output	×	×	O
External sync input	O	O	O
Loop-through output	×	O	×
Clock output	×	O	×
WEN output	O	×	×
TRIG input	O	×	×

*1 Separate video signals are output from pin no. 4 and pin no. 9 (for XC-7500/8500CE).

*2 Video output from pin no. 4 is output from two BNC connectors via two buffer amps.

Note

The above products do not support connecting to RS-232C of XC-HR90 or XC-555.

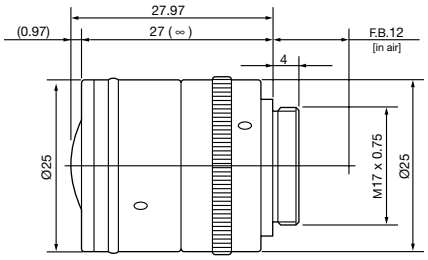
XC Series Camera Input/Output Chart for DC-700

	VIDEO 1	VIDEO 2	HD	VD/SYNC	WEN	TRIG	Note
12-pin connector pin no.	No.4	No.9	No.6	No.7	No.10	No.11	
XCI-SX1/V3	×	×	TTL IN	TTL OUT	Exposure OUT	O	
XCD-V60/V60CR/SX90/SX90CR/U100/U100CR	×	×	×	×	×	O	
XCL-5000/5005/5005CR	×	×	×	×	GND/DVAL /Exposure	O	
XCL-U1000/U1000C	×	×	×	×	Exposure OUT	O	
XCL-X700/V500	×	×	HD	VD	O	O	
XC-HR90	O	×	HD	VD	O	O	
XC-HR70	O	×	HD	VD	O	O	
XC-HR50/HR57	O	×	HD	VD	O	O	
XC-HR58	O	×	HD	VD	O	O	
XC-56/56BB	O	TRIG*	HD	VD	×	× *	TRIG assigned to No.9
XC-ST Series	O	×	HD	VD/VS	O	O	
XC-E Series	O	×	HD	VD	O	O	
XC-555	VBS/Y*	C*	HD	VD/VS/VBS	×	×	VBS, Y/C available

NF-Mount Lens (Fixed Focus)

VCL-03S12XM

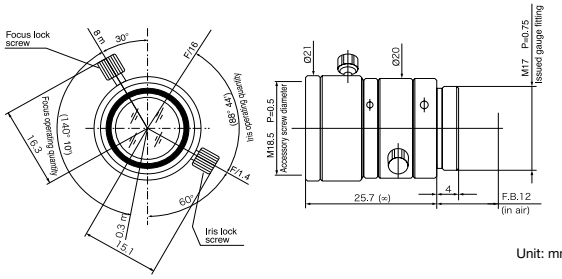
Focal length	3.5 mm
Aperture (F-number)	F1.8 to F16
Minimum object distance (MOD)	300 mm
Mass	40 g



Unit: mm

VCL-06S12XM

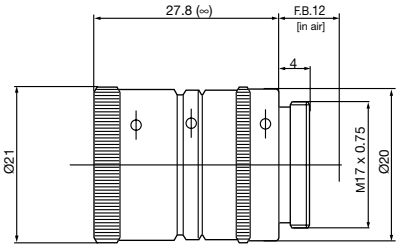
Focal length	6 mm
Aperture (F-number)	F1.4 to F16
Minimum object distance (MOD)	298 mm
Mass	25 g



Unit: mm

VCL-12S12XM

Focal length	12 mm
Aperture (F-number)	F1.4 to F16
Minimum object distance (MOD)	298 mm
Mass	25 g



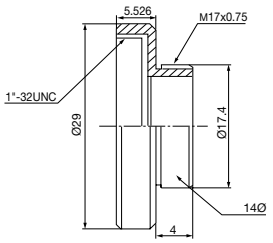
Unit: mm

MOD: Minimum object distance from the edge of the lens body to the photo subject.

Lens Accessories

■C-mount adaptor

When a C-mount type lens is attached, a C-mount adaptor (LO-999CMT) is required.

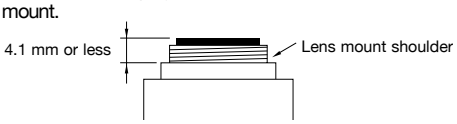


Unit: mm

LO-999CMT

Mass	12 g

Be sure that the lens does not project more than 4.1 mm from the lens mount.



For setting the camera when using C-mount adaptor, fix the lens mount (C-mount) instead of fixing the camera head in order to avoid applying unnecessary forces to the camera head.

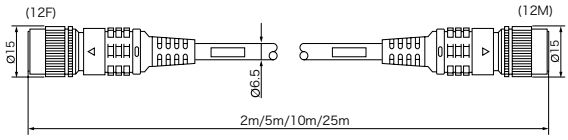
Avoid using C-mount adaptor in the places where vibrations or shocks are applied often. Doing so will damage the equipment or loosen the connection.

Cables

■ Camera cable (for XC series)

This 12-pin camera cable is used for connecting an XC camera to a DC-700/700CE camera adaptor or JB-77 junction box.

CCXC-12P02N (2m)	(Aspect of connector: straight)
12P05N (5m)	(Aspect of connector: straight)
12P10N (10m)	(Aspect of connector: straight)
12P25N (25m)	(Aspect of connector: straight)



Unit: mm

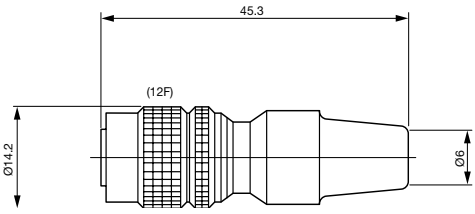
- Camera connection (12-pin/female) ⇔ DC-700 (JB-77) connection (12-pin/male)
- Shielded

Connectors

■ Connectors

PC-XC12

- 12-pin/female



Unit: mm

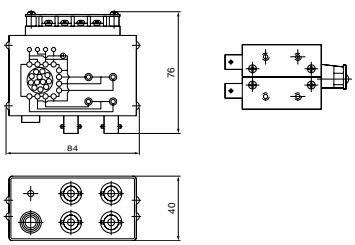
Junction Box

■ Junction Box

This junction box enables simple conversion from 12-pin camera cable to BNC. Also, 12V DC can be supplied from general-purpose power supply to the junction box's power terminal.

JB-77

- Camera cable connection (12-pin x 1)
- Video OUT (BNC x 1)
- Clock OUT (BNC x 1)
- VD IN/OUT (BNC x 1)
- HD IN/OUT (BNC x 1)



Unit: mm

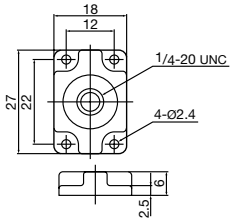
Tripod Adaptor

■ Tripod Adaptor

Use these adaptors to mount a camera on a tripod. Use the included screws to attach the adaptor to the camera.
The adaptors are threaded for commercially available tripods.

VCT-333I

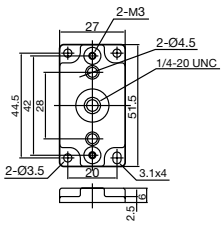
- Material: ABS resin
- Insulated type



Unit: mm

VCT-55I

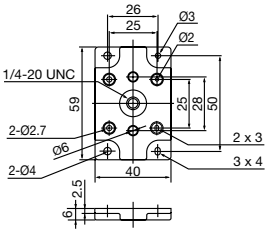
- Material: ABS resin
- Insulated type



Unit: mm

VCT-ST70I

- Material: ABS resin
- Insulated type



Unit: mm

DXC-390/390P

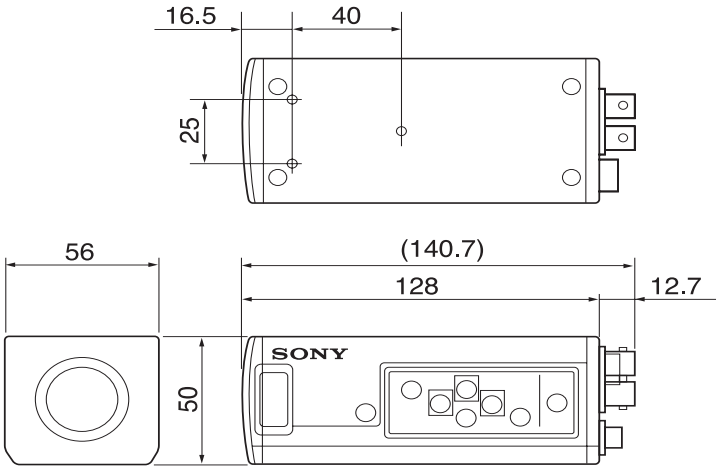
Outline

The Sony DXC-390P is a 1/3 type DSP 3-CCD colour video camera which incorporates Exwave HAD™ technology – a Sony technology that greatly improves camera sensitivity (F8 at 2000 lx) while reducing smear. Using a C-mount lens and providing a resolution of 800 TV lines and high S/N ratio, the DXC-390P is ideal for applications such as microscopy, industrial inspection, and remote camera systems, where picture accuracy and detail are important. Incorporating new 10-bit DSP technology, a user- friendly on-screen menu allows for simple control of various features including DynaLatitude™, Partial Enhance, and a wide selection of Automatic Exposure (AE) modes. Moreover, the DXC-390P is very compact [56 (W) x 50 (H) x 128 (D) mm] and lightweight (370 g), making it easy to install.

Features

- 1/3-type IT 3-CCD Colour video camera with Exwave HAD™ technology
- 10 bit Digital Signal Processor (DSP) technology for powerful picture contrast controls
- Horizontal resolution – 800 TV lines
- C mount
- Strobe Trigger Function – Realizes full vertical resolution of fast moving objects
- Full control of functions accessible from the side panel or through the optional RM-C950 remote control unit
- Colour shading compensation and flange back adjustment
- Wide selection of Automatic Exposure (AE) modes – User defined light metering area, selectable AE speed, wide range
- Hyper Gain (+30 dB)
- Extended Genlock (VBS Genlock and HD/VD) – Allows synchronization with frame grabber boards
- Scene files and user files – Enables the user to set two custom parameters in the menu for instant recall
- RS-232C interface
- S/N ratio: 62 dB (DXC-390)/61 dB (DXC-390P)
- Video Outputs – RGB, Y/C, composite
- Ideal for point-of-view, microscopy and machine vision applications

Dimensions



Unit: mm

Specifications

	DXC-390	DXC-390P
Signal System	NTSC	PAL
Image Device	1/3-type IT CCD with Exwave HAD technology	
Effective Picture Elements	Approx. 380,000 pixels	Approx. 440,000 pixels
Sensing Area	4.8 (H) x 3.6 (V) mm	
Scanning System	2:1 interlaced, 525 lines	2:1 interlaced, 625 lines
Horizontal Frequency	15.734 kHz	15.625 kHz
Vertical Frequency	60 Hz	50 Hz
Sync. System	Internal or external with VBS, HD/VD	
Phase Control	H/SC phase control	
Horizontal Resolution	850 TV lines 800 TV lines	
Sensitivity	F11 (2000 lux) F8.0 at 2000 lux	
Min. Illumination	4 lux (F2, GAIN: HYPER)	
S/N Ratio	62 dB	61 dB
Gain	STEP/AGC/HYPER selectable	
Electronic Shutter	OFF/ STEP/ VARIABLE/CCD IRIS selectable	
Lens Mount	C mount	
AE Area	Multi/Large/Medium/Spot/Slit/Manual	
AE Level	Variable	
AE Speed	Fast/Mid/Slow selectable	
AE Detect	Average/Peak selectable	
Contrast Effect	Manual/DynaLatitude/DCC+ selectable	
Knee Point	High/ Normal/ Low selectable (Contrast Effect: Manual)	
Black Stretch	Variable (Contrast Effect: Manual)	
Gamma	ON/ OFF Variable	
Pedestal	Master, R/B Manual adjustable	
Black Balance	ABB	
White Balance	AWB/ATW NORMAL/ATW/ WIDE/MANUAL/3200 K/5600 K/selectable AWB or ATW R/B Paint, MANUAL R/B Gain	
ATW Area	NORMAL/ MANU selectable	
ATW Speed	SLOW/MID/FAST FAST/ NORMAL/ SLOW selectable	
Detail Level	ON/ OFF (Variable at ON)	
Detail Frequency	HIGH/ MID/ LOW selectable	
Linear Matrix	ON/ OFF	
Linear Matrix MODE	STANDARD/R Enhance/G Enhance/B Enhance/Manual Selectable	
Partial Enhance	All/In/Out selectable	
CCD Integration Mode	Field/Frame selectable	
Shading Compensation	ON/OFF (manual)	
Trigger Polarity	Positive edge trigger / Negative edge, trigger selectable	
Baud Rate	19200/9600/4800/2400/1200 selectable	
Sync	RGB/G/OFF	
Strobe	ON/OFF	
User File	A/ B switchable (Two pattern memories)	
Scene File	Standard/Microscope/Full Auto/Strobe/File A or B	
Output Signal	VBS / RGB / SYNC / Y / C	
Operating Temp.	-5°C to +45°C (23°F to 113°F)	
Storage Temp.	-20°C to +60°C (-4°F to +140°F)	
Power Requirements	DC 10.5 V ~ 15.0 V	
Power Consumption	Approx. 7.6 W	
Dimensions	56 (W) x 50 (H) x 128 (D) mm (2 1/4 x 2 x 5 1/8 inches) (Excluding projecting parts)	
Weight	Approx. 370 g	
Connectors	Lens (6 pin) RGB / SYNC (9 pin D-sub) DC IN / VBS (12 pin) VIDEO OUT (BNC) TRIGGER IN (BNC) REMOTE (8 pin mini DIN)	
Flange Back	—	
Trigger	—	
Serial	—	

Optional Accessories

Accessory	Reference	Description
C mount zoom lens	VCL-616WEA	1/3" 16x motorised lens
Mount adaptor	LO-32BMT	2/3-inch lens mount adaptor
AC Camera adaptor	CMA-D2	19-in rackable 12V power supply and video signal transmitter over CCMC 12 pin cable
	CMA-D3	Power supply with maximum 100 m cable extension and camera
Remote control unit	RM-C950	Control all camera functions including zoom/focus/iris through RS-232C interface
Cable	CCDC-5/US	12 pin <> 4 pin DC cable (5m)
	CCDC-10/US	12 pin <> 4 pin DC cable (10m)-
	CCDC-25/US	12 pin <> 4 pin DC cable (25m)
	CCDC-50A	12 pin <> 4 pin DC cable (50m)
	CCDC-100A	12 pin <> 4 pin DC cable (100m)
	CCMC-20P30	CHU to CCU cable (30m)
	CCMC-3MZ	For connection of CMA-D3/CE, capable of connecting to the CCZ-/A5/A10/ A25/A50/A100 cables (3m)
	CCXC-9DB/US	9 pin D-sub <> 5 BNC RGB Cable (5m)
	CCMC-9DS/US	9 pin D-sub <> 4 BNC RGB Cable (5m)
	CCMC-200	5m Cable — Composite Out

CMA-D2CE

RM-C950

CMA-D3CE

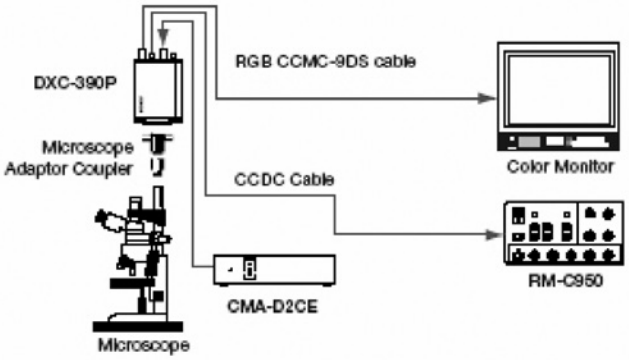
VCL-616WEA

Applications

Microscopy

Useful DXC-390P functions include:

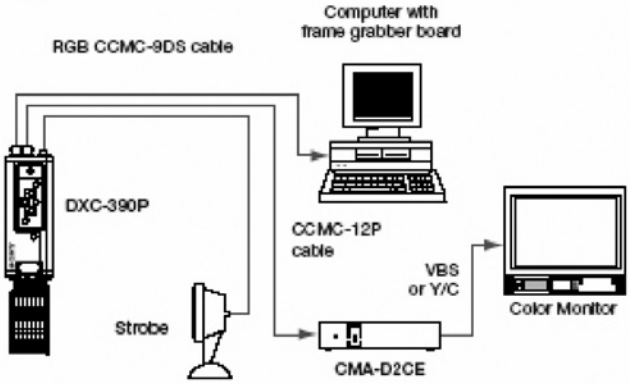
- DynaLatitude
- Digital Detail
- Partial Enhance
- Color Shading
- Compensation
- Flange Back Adjustment

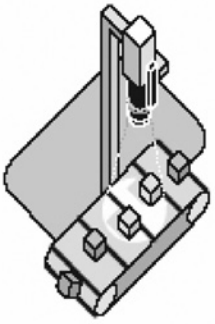


Industrial Inspection

Useful DXC-390P functions include:

- Strobe trigger function
- WEN output
- RGB sync
- RS-232C Interface
- Extended Genlock (VBS GENLOCK and HD/VD In/Out)

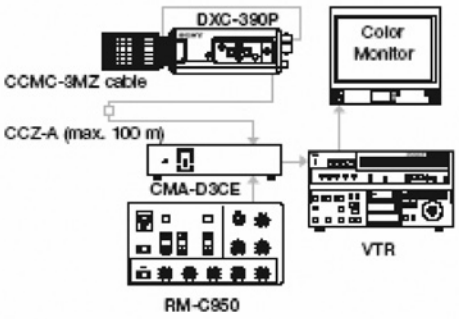


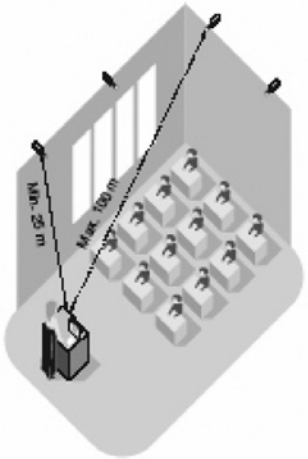


Remote Camera System

Useful DXC-390P functions include:

- Motorised remote control lens
- Selectable AE speed
- User-defined AE area
- Video servo auto iris lens





DXC-990/990P

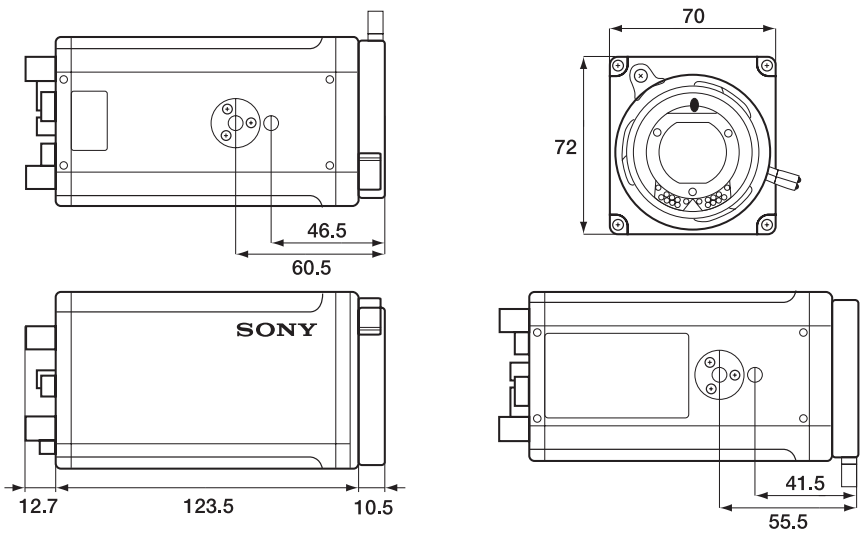
Outline

The Sony DXC-990P is a 1/2 type DSP 3-CCD Colour video camera which incorporates ExwaveHAD™ technology – a Sony technology that greatly improves camera sensitivity (F11 at 2000 lx) while reducing smear. The DXC-990P not only inherits all of the advanced functions of its predecessor, the DXC-950P, but also includes improved technology and innovative features for versatile operation in the same body size. Allowing use of a high quality Bayonet mount lens, and providing a resolution of 850 TV lines and high S/N ratio, the DXC-990P is ideal for applications such as microscopy, industrial inspection and remote camera systems where picture accuracy and detail are important. Incorporating new 10-bit DSP technology, a userfriendly on-screen menu allows for simple control of various features including a DynaLatitude™ function, Partial Enhance, and a wide selection of Automatic Exposure (AE) modes.

Features

- 1/2-type IT 3-CCD colour video camera with Exwave HAD technology for superior picture quality
- 10 bit Digital Signal Processor (DSP) for powerful picture contrast control
- Horizontal resolution – 850 TV lines
- Bayonet mount
- DynaLatitude™, DCC+, Black Stretch, Partial Enhance
- Scene File and User File
- Colour shading compensation
- AE function (User defined light metering area, Selectable AE speed, Wide range)
- Abundant electronic shutter function
- Versatile white balance
- Genlock capability (VBS, HD/VD)
- Strobe function, Hyper gain, WEN, HD/VD output, RGB sync
- Flicker canceller
- RS-232C interface
- Video Outputs – RGB, Y/C, component, composite
- On-screen menu
- S/N ratio – 62 dB
- High sensitivity – F11 (2000 lux)
- Ideal for semiconductor, print inspection, microscopy and remote monitoring applications

Dimensions



Specifications

	DXC-990	DXC-990P
Signal System	NTSC	PAL
Image Device	1/2-type IT CCD with Exwave HAD technology	
Effective Picture	Elements Approx. 380,000 pixels	Approx. 440,000
Sensing Area	6.4 (H) x 4.8 (V) mm	
Scanning System	1/2-type interlined	
Horizontal Frequency	15.734 kHz	
Vertical Frequency	59.94 Hz	
Sync. System	Internal or external with VBS, HD/VD	
Phase Control	—	
Horizontal Resolution	850 TV lines	
Sensitivity	F11 (2000 lux)	
Min. Illumination	1 lux (F1.4, GAIN: HYPER)	
S/N Ratio	63 dB	62 dB
Gain	STEP/AGC (0-24 dB)/HYPER	
Electronic Shutter	0.5 - 1/100,000 sec	
Lens Mount	Bayonet mount	
AE Area	Multi/Large/Medium/Spot/Slit/Manual	
AE Level	Variable	
AE Speed	Fast/Mid/Slow selectable	
AE Detect	Average/Peak selectable	
Contrast Effect	Manual/DynaLatitude/DCC+ selectable	
Knee Point	High/Normal/Low selectable	
Black Stretch	Variable Variable (Contrast Effect: Manual)	
Gamma	ON/OFF	
Pedestal	Master, R/B	
Black Balance	ABB	
White Balance	AWB/ATW NORMAL/ATW/ WIDE/MANUAL/3200 K/5600 K/selectable AWB or ATW R/B Paint, MANUAL R/B Gain	
ATW Area	NORMAL/ MANUAL	
ATW Speed	SLOW/MID/FAST	
Detail Level	ON (Variable)/OFF	
Detail Frequency	HIGH/MID/LOW	
Linear Matrix	ON/OFF	
Linear Matrix MODE	STANDARD/R Enhance/G Enhance/B Enhance/Manual Selectable	
Partial Enhance	All/In/Out	
CCD Integration Mode	Field/Frame Field/Frame selectable	
Shading Compensation	ON/OFF (manual)	
Trigger Polarity	Positive edge trigger/Negative edge trigger selectable	
Baud Rate	19200/9600/4800/2400/1200 selectable	
Sync	RGB/G/OFF	
Strobe	Slave	
User File	A/B	
Scene File	Standard/Microscope/Full Auto/Strobe/File A or B	
Output Signal	VBS, RGB/SYNC, Y/C,Y/R-Y/B-Y	
Operating Temp.	-5°C to +45°C (23°F to 113°F)	
Storage Temp.	-20°C to +60°C (-4°F to +140°F)	
Power Requirements	DC 10.5 V ~ 15.0 V	
Power Consumption	Approx. 8.0 W	
Dimensions	70 (W) x 72 (H) x 123.5 (D) mm	
Weight	630 g	
Connectors	RGB/SYNC (9pin D-sub),DC IN/VBS (12pin),VIDEO OUT (BNC),TRIGGER IN (BNC),REMOTE (8 pin mini DIN),GEN LOCK IN (BNC),LENS (6pin)	
Flange Back	—	
Trigger	On/Off	
Serial Data	RS-232C	

Optional Accessories

CMA-D2CE/D2MDCE

Camera Adaptor
- Supplies DC power and transmits video/sync signal between the adaptor and the DXC-990P with CCMC 12-pin multi-core cable
- Complies with medical safety standard (CMA-D2MDCE Only)
- Dimensions: 210 (W) x 50 (H) x 200 (D) mm
- Max. cable length: 25 m with CCMC-12P25 cable

CMA-D3CE

Camera Adaptor
- Supplies DC power and transmits video/sync signal between the adaptor and the DXC-990P with CCZ-A cable and CCMC-3MZ cable
- Connects with optional RM-C950 remote control unit
- AC IN/DC IN
- Composite, Y/C, RGB or component video signal output
- Dimensions: 210 (W) x 44 (H) x 210 (D) mm
- Max. cable length: 100 m with CCZ-A100 cable

RM-C950

Remote Control Unit
- Full remote control of the DXC-990/990P camera functions and lens zoom/focus/iris functions via RS-232C
- Dimensions: 212 (W) x 41 (H) x 132 (D) mm

CCMC-12P02/12P05/12P10/12P25

12-pin Multi Cable (2/5/10/25 m)

CCDC-5/10/25/50A/100A

DC Cable (5/10/25/50/100 m)

CCMC-3MZ

Camera Cable
(3 m, for CMA-D3CE connection, capable of connecting to the CCZ-A2/A5/A25/A50/A100 cables, CCZZ-1E interconnection adaptor is supplied)

CCMC-9DS

9-pin D-sub Cable
(5 m, 9-pin D-sub ↔ BNCs (R/G/B/SYNC), DIN 4-pin (Y/C))

LO-32BMT

2/3-inch Lens Mount Adaptor

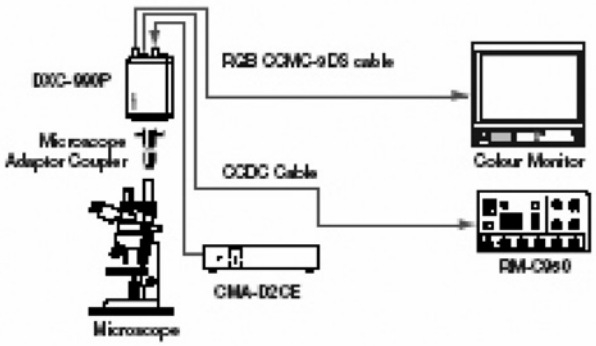
VCL-0716BXA

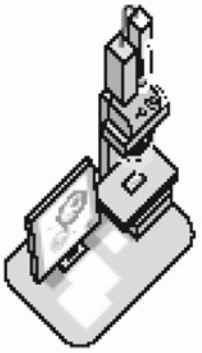
Mount	1/2 Type Bayonet
Focal length	7.3 mm to 117 mm
Zoom ratio	16x
Iris range	F1.9 to F16, closed
Flange focal length	38mm (adjustable range ±0.3 mm)
Min. object distance	1 m (0.04 m in macro operation)
Filter screw	M62 x 0.75
Dimensions (W x H x D) mm	90.5 x 75.0 x 144.2
Mass	0.85 kg

Applications

Microscopy

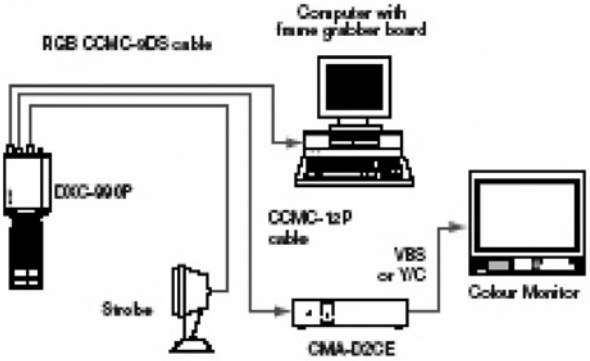
The DXC-990P features DynaLatitude, Digital Detail, Partial Enhance and Color Shading Compensation functions which are useful for microscopy applications.

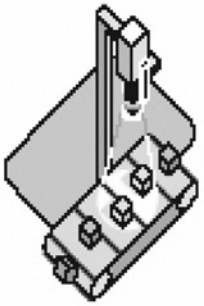




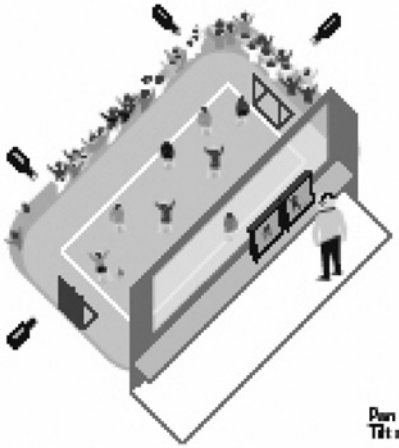
Industrial Inspection

The DXC-990P features Strobe trigger function, WEN output, RGB sync, RS-232C Interface and Extended Genlock (VBS GENLOCK and HD/VD In/Out) functions which are useful for industrial inspection applications.



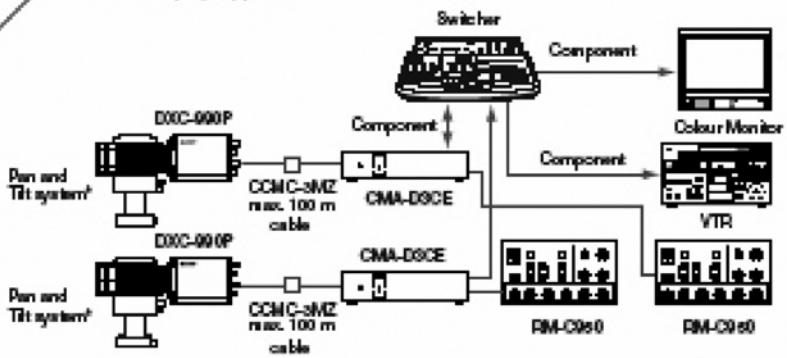


Remote Camera System



The DXC-990P features Motorized remote control lens, Selectable AE speed and User-defined AE area which are useful functions for remote camera applications. A pan and tilt system is a compact remote-controlled system for indoor operation, designed to accomodate miniature CCD-cameras and that covers a wide range of applications, including standard monitoring applications or remote monitoring of places where utmost silence is required, such as churches, wedding-halls, theatres or in TV-studios.

* PTZ systems are available from third party suppliers.



Obsolete Models Last Production Date

Monochrome Camera

XCD-SX910UV	'08
XCD-SX910	'08
XCD-X710	'08
XCD-V50	'08
XC-55BB	'04
XC-55	'04
XCD-SX900UV	'04
XC-HR300	'04
XC-7500	'04
XC-8500CE	'04
XCD-X700	'04
XCD-SX900	'04
XC-73	'01
XC-73CE	'01
XC-73L	'01
XC-75	'01
XC-75CE	'01
XC-75L	'01
XCH-1125	'99
XC-77	'99
XC-77CE	'99
XC-77BB	'99
XC-77BBCE	'99
XC-77RR	'99
XC-77RRCE	'99
XC-37	'93
XC-38	'93
XC-39	'93
XC-57	'93
XC-57CE	'93

Colour Camera

DFW-SX910	'08
DFW-X710	'08
XCD-SX910CR	'08
XCD-X710CR	'08
XCD-V50CR	'08
DFW-X700	'04
DFW-SX900	'04
XC-003	'04
XC-003P	'04
DFW-V500	'04
DFW-VL500	'04
EVI-D30	'04
EVI-D31	'04
XC-777A	'02
XC-777AP	'02
XC-999	'02
XC-999P	'02
CCM-DS250	'01
DFW-V300	'01
EVI-G20	'01
EVI-G21	'01
EVI-R10	'01
EVI-R11	'01
EVI-R50	'01
EVI-R51	'01
XC-333	'00
XC-333P	'00
XC-711	'00
XC-711P	'00
XC-711RR	'00
CCM-PC5	'99
XC-009	'99
XC-009P	'99
XC-007	'98
XC-007P	'98
XC-117	'93
XC-117P	'93

Card Camera (Monochrome/Colour)

CCB-M25	'04
CCB-M27B	'04
CCB-M35A	'04
CCB-ME37	'04
CCB-ME47	'04
CCB-M25CE	'02
CCB-M27BCE	'02
CCB-M35ACE	'02
CCB-M37	'02
CCB-M37CE	'02
CCB-ME37CE	'02
CCB-MS37CE	'02
CCB-GC7YC	'02
CCB-ME47CE	'01
CCB-GC7YCP	'01
CCB-GL5	'99
CCB-GL5P	'99
CCB-GL5YC	'98
CCB-GL5YCP	'98

Camera Block

FCB-EX78B	'07
FCB-EX78BP	'07
FCB-EX780B	'07
FCB-EX780BP	'07
FCB-S3000	'07
FCB-S3000P	'07
FCB-IX45A	'06
FCB-IX45AP	'06
FCB-IX47A	'06
FCB-IX47AP	'06
FCB-EX45M	'06
FCB-EX45MCE	'06
FCB-EX45B	'06
FCB-EX45BP	'06
FCB-EX48B	'06
FCB-EX48BP	'06
FCB-EX480B	'06
FCB-EX480BP	'06
FCB-IX10A	'05
FCB-IX10AP	'05
FCB-EX45A	'04
FCB-EX45AP	'04
FCB-EX48A	'04
FCB-EX48AP	'04
FCB-EX480A	'04
FCB-EX480AP	'04
FCB-EX780S	'04
FCB-EX780SP	'04
FCB-IX10	'03
FCB-IX10P	'03
FCB-IX47	'03
FCB-IX47P	'03
FCB-EX48L	'03
FCB-EX48LP	'03
FCB-EX480L	'03
FCB-EX480LP	'03
FCB-EX480X	'03
FCB-EX480XP	'03
EVI-400	'02
EVI-400DR	'02
EVI-401	'02
EVI-401DR	'02
FCB-EX470L	'02
FCB-EX470LP	'02
EVI-330	'01
EVI-330T	'01
EVI-331	'01
EVI-331T	'01
EVI-370	'01
EVI-370D	'01
EVI-370DG	'01
EVI-371	'01
EVI-371D	'01
EVI-371DG	'01
CCB-EX37	'00
CCB-EX37P	'00
FCB-EX47L	'00
FCB-EX47LP	'00
FCB-IX470	'00
FCB-IX470P	'00
EVI-310	'99
EVI-311	'99
EVI-370G	'99
EVI-371G	'99
EVI-330V	'98
EVI-331V	'98
EVI-900	'98
EVI-901	'98
EVI-130	'97
EVI-131	'97
EVI-110	'96
EVI-111	'96
XCB-009	'96
XCB-009P	'96
EVI-100	'93
EVI-101	'93
EVI-1011	'93
EVI-1011P	'93
EVI-200	'93
EVI-201	'93

Cable

CCXC-T20P02	'05
CCXC-6P05	'04
CCXC-9DD	'04
CCXC-9DB	'04
CCE-50R	'04
CCE-50M	'02
CCE-150R	'02
CCXC-12P02S	'00
CCXC-12P05S	'00
CCXC-12P05U	'00
CCXC-12P05D	'00
CCXC-12P05L	'00
CCXC-12P05R	'00
CCXC-12P10S	'00
CCXC-12P25S	'00
CCXC-T20P05	'00
CCXC-T20P10	'00
CCXC-20P20	'00
CCXC-H12P05	'00
CCXC-H20P05	'00
CCXC-20P20	'99
CCXC-12P02	'98
CCXC-12P05	'98
CCXC-12P10	'98
CCXC-12P25	'98

Lens

VCL-08YM	'08
VCL-12YM	'08
VCL-16Y-M	'08
VCL-25Y-M	'08
VCL-50Y-M	'08
VCL-12SXM	'06
LO-75D	'05
VCL-08WM	'05
VCL-16WM	'05
VCL-25WM	'05
50MM MACRO LENS	'05
LO-77ERK	'05
LO-999ERK	'05
VCL-0637W	'04
VCL-M45YM	'02
25MM HD LENS	'02
LO-37ND	'02
LO-37IR	'02
VCL-707BXM	'99
VCL-714BXEA	'99
CCL-06Z	'99
CCL-M05XE	'99
CCL-M07XE	'99
CCL-C04XE	'98
CCL-C08XE	'98
CCL-M03XE	'98
LO-C35	'98
LO-G35	'98
VCL-25BXM	'97
VCL-08SBYA	'93
VCL-16SBY	'93
VCL-25BY	'93
42MM Whole Mirror Lens	'93
Variable Focusing Lens	'93
LO-37CMT	'93
LO-39CMT	'93

Others

PC-XC04	'07
DFWS-77	'04
CMA-87	'04
PC-XC06	'04
VCT-37	'04
VCT-75I	'04
PSB-915IA	'04
CMA-999	'02
CMA-999P	'02
PC-XC03	'02
LO-GC7	'02
XCK-L777	'02
DFWA-400	'01
MVA-15	'01
DC-777	'00
DC-777CE	'00
DC-77RR	'00
DC-77RRCE	'00
FK-63	'00
FK-69	'00
IF-51	'00
DVBK-1/A	'00
LDI-100B	'00
LDI-D100B	'00
LDI-D50B	'00
FK-57	'99
LMD-1040XC	'99
MSI-1125	'99
MVA-40	'99
MVA-41A	'99
SEU-2092	'99
VCT-77RR	'99
YP-186XC	'95
CBK-117	'93
CBK-38GL	'93
DC-37	'93
DC-38	'93
DC-39	'93
VCT-57I	'93
XCM-003	'00
XCM-009	'00
XCM-7500	'00
XCM-7573	'00
XCM-8500	'00
XCM-37	'93
XCM-38	'93
XCM-39	'93
XCM-57	'93
XCM-117	'93
VK-120A	

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